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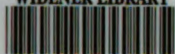
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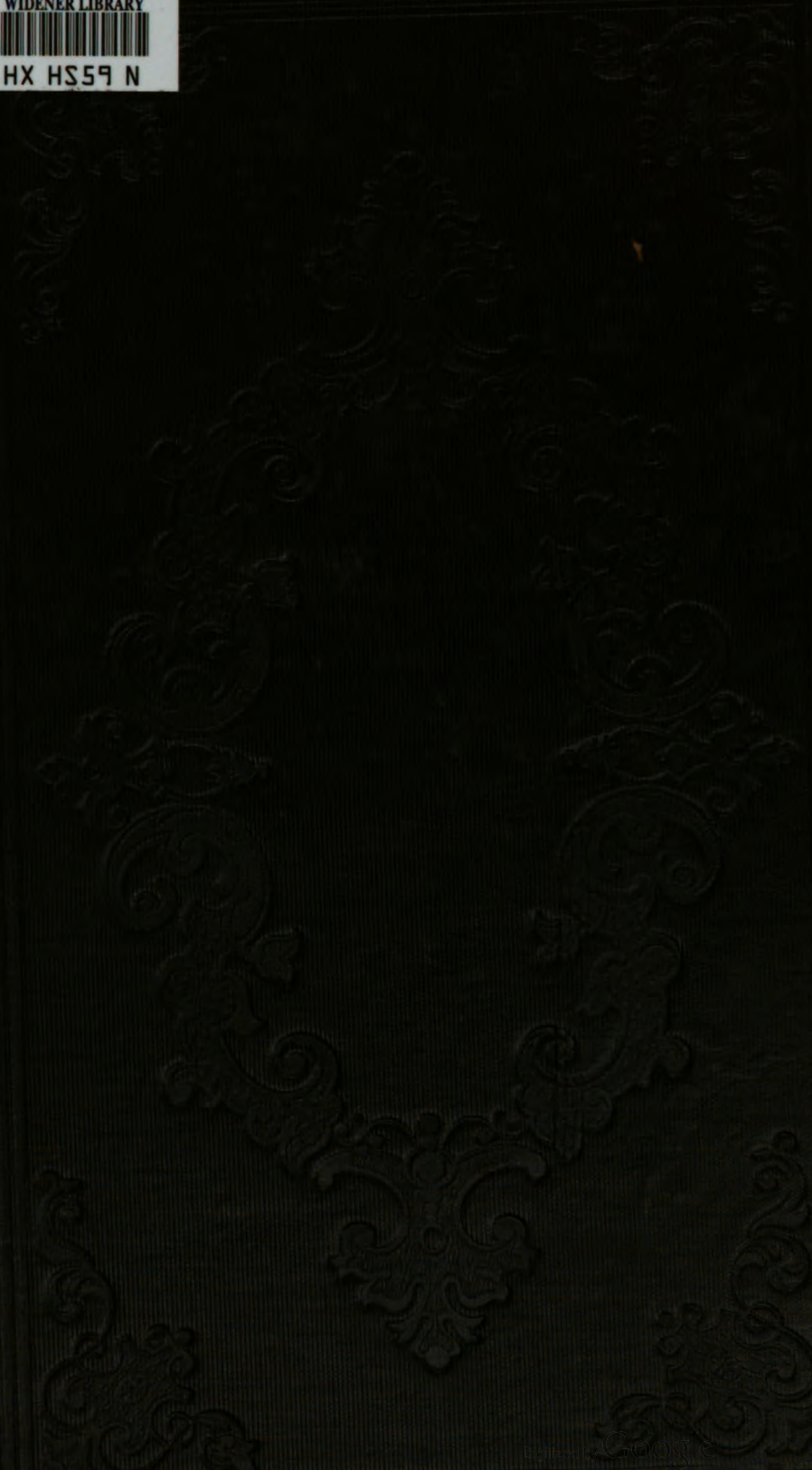
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ELEVENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE.

1866.



AUGUSTA:

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1866.

~~38 L.~~

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BOARD OF AGRICULTURE.

JOHN F. ANDERSON, PRESIDENT.

ASA SMITH, VICE PRESIDENT.

S. L. GOODALE, SECRETARY.

(TERM EXPIRES JANUARY, 1867.)

Address.

JOHN F. ANDERSON,	Cumberland,	South Windham.
GEORGE A. ROGERS,	Sagadahoc,	Topsham.
AMASA BIGELOW,	Somerset,	Bloomfield.
JOHN BACHELDER,	Oxford,	North Fryeburg.
S. L. GOODALE,	York,	Saco.

(TERM EXPIRES JANUARY, 1868.)

ASA SMITH,	Penobscot,	Mattawamkeag.
SAMUEL WASSON,	Hancock,	Ellsworth.
EDWIN R. FRENCH,	Franklin,	South Chesterville.
GEORGE H. FREEMAN,	Aroostook,	Presque Isle.
PHINEHAS M. JEFFERDS,	Piscataquis,	Foxcroft.
JOHN C. TALBOT,	Washington,	East Machias.

(TERM EXPIRES JANUARY, 1869.)

J. M. CARPENTER,	Kennebec,	Pittston.
—————	Waldo,	—————
—————	Lincoln,	—————
RUFUS PRINCE,	Androscoggin,	Turner.
CALVIN CHAMBERLAIN,	State Society,	Foxcroft.

REPORT.

To the Senate and House of Representatives :

The members of the Board of Agriculture assembled in the Capitol, at Augusta, on Wednesday, January 17, 1866, and being called to order by the Secretary, were temporarily organized by the choice of Asa Smith, Chairman.

Messrs. Rogers, French and Anderson, were appointed a Committee on Credentials. They reported a quorum present.

Permanent organization was effected by the election of

JOHN F. ANDERSON, *President.*

ASA SMITH, *Vice President.*

S. L. GOODALE, *Secretary.*

The rules and orders of last session were adopted for present use.

Voted, That hereafter the Secretary be, *ex officio*, Chairman of the Business Committee.

The Business Committee was then constituted by the appointment of Messrs. Chamberlain, Wasson and French as additional members.

The following resolutions, introduced by Mr. French, were unanimously adopted :

"Whereas, It has pleased an Allwise Providence in the course of human events to remove from our midst one of the most earnest friends of agriculture the State ever had, and the pioneer of our agricultural press, therefore,

Resolved, That in the death of the late Dr. Ezekiel Holmes, we lament one who watched over the farmers of Maine and their interests with the solicitude of a father for his children ; one whose mouth was ever open for instruction, whose lips dropped knowledge, and whose pre-eminent abilities made him an honor to the State, and endeared him to us all.

Resolved, That in recognition of his services, and as a fitting testimonial on behalf of this Board, the President select some member to pronounce a eulogy on his life and character, during our present session."

Mr. French was appointed to pronounce the eulogy.

Pending the Report of the Business Committee, *ad interim* reports were presented and read, as follows :

Mr. Chamberlain reported on the topic :

Is the ox-yoke, as used with us, a natural or an absurd implement of draught?

It will, perhaps, not be denied that we, in common with all people, to some extent are governed by traditions—do some things as a national habit—run on in the grooves and ruts worn by our fathers—do not often stop to test our modes and manners by our powers of reason. While we attempt to analyze many things, we fail to make an analysis of our own habits and customs and methods of doing things.

One of the greatest goods to man is found in animals adapted to do his labor. This is particularly true with the people who colonized this continent and in so brief a period have grown to powerful nations. Here forests have been cleared away, a world supplied with lumber, rocks have been removed in making farms, prairies have been broken up—the vast material requiring removal and transport over rough roads and without roads, while a wild continent has been transformed into a home of civilization, has been mainly performed by the labors of many millions of men

The colonists from the several countries of Europe brought with them their national modes of harnessing, yoking, and attaching their animals to their implements of labor. We see here the force of tradition : three hundred years having effected no change anywhere in the manner of yoking oxen. The Spaniard in the countries he subdued still lashes the yoke to the heads of his oxen. The descendants of the French colonists in the Eastern of the British North American colonies, and in Louisiana, adhere to their national mode—substantially the Spanish. The English and Dutch have stamped their nationality on a portion of the continent, and yoked *their* descendants to a tradition, that, however absurd it may prove on investigation, has hitherto rarely been criticised.

The caption to this paper is doubtless wisely introduced as a topic here, but an error was committed in its reference—assigning it to a party who raises no steers. It is one of a class of practical

questions that theorizing alone can never elucidate; it must be practically and thoroughly tested.

That this subject might be presented to the Board in a dress entitling it to be kept in sight for a season, we opened a timely correspondence with gentlemen in the British Provinces, and succeeded in obtaining a reference to a competent gentleman, and a promise from him to furnish us with an account of the French method, and the comparative advantages of the two modes, as proved in the lumber operations and other heavy labor in which oxen are employed, but have failed to receive the promised information.

We invited a considerable farmer in our neighborhood to put a pair of steers in training with the Spanish yoke; but he declined the proposition in terms implying that he had no steers mean enough to be subjected to so gross an indignity. He said that "in our method oxen could exert great force, could be worked almost constantly, and with good care could be kept in a growing and thriving condition; and that the yoke admitting such results was good enough, and might as well be let alone." All of which sentiments may be characterized with good sense. But such individual conclusions should not deter us from pursuing our inquiry.

We rarely see anything written on the matter in hand. But in a recently published book from an eminently literary gentleman,* we find the following: "It is surprising to see the sagacity with which the dull and clumsy ox—hampered as he is by the rigid yoke, the most absurd implement of draught ever contrived by man—picks his way, when once trained to forest work, among rocks and roots, and even climbs over fallen trees, not only moving safely but drawing timber over ground wholly impracticable for the light and agile horse."

Another has recently broken the shell of tradition and stepped out, a vigorous, "live Yankee." He has dared to write as follows:† "An ill-founded notion seems to have possessed the minds of not a few farmers and teamsters, touching the *ability* of the ox to force a load back by the horns. To this prejudice I attribute the general failure of working cattle in this particular.

It is, however, an easily demonstrated fact that nature has

* "Man and Nature; or Physical Geography as modified by human action." By George P. Marsh.

† "The Education of the Ox." An Essay by A. B. Davis. See appendix to twelfth annual Report of the Secretary of the Mass. Board of Agriculture.

lodged more strength in the *neck* and head of the ox, than in his breast and shoulders. This is patent to the most casual observation of bulls and oxen when *fighting*. The size and strength of the *horns* of the ox also favor this view. In some parts of Europe this principle seems to be better understood; hence we find the ox and cow appropriately harnessed for draft by the horns, and executing their tasks with apparent ease.

* * * In the matter of ox-yokes my experience has not failed to impress me with the need of a revolution—most of those in common use being too *heavy*, ‘bungling,’ and every way inconvenient.”

The yokes here referred to are very modest, unassuming articles compared with those used in our section of Maine. With us, a yoke is made from a piece of timber 14 by 8 inches. This answers to the principle involved—that the point of draft shall be below the centre of the bow—centre of the neck. Without this depth, the yoke would be condemned as too straight. It would “roll up,”—would bring the stress on the top of the neck where the ox could exert no force. This principle involves the necessity for making the yoke and bow of great strength, to resist the thrust of the breast on the bottom of the bow.

Our largest yokes, fully equipped, weigh from 70 to 100 lbs. This applied principle courts an examination. It is a transfer of the working point in the ox, from the head and the enlarged spinal cord in the neck, where nature located his strength, to his breast—well down to the legs; and to make the transfer available, the muscles of the shoulders are bound in a wooden hoop so as essentially to impede his locomotion. If this were the universally adopted theory where the yoke and bows are in use, it might carry the appearance of having been founded in reason; but the facts are, this deep-yoke-theory is a mere provincialism. We well recollect on our first visit to Massachusetts, one of the *curiosities* we found on farms was the ox-yoke made from a stick 6 by 6 inches, or about one-fifth the material required for a yoke in Maine. In reply to our first expression of surprise, that oxen could work in such a yoke, we were asked what we should think of a New York yoke, made from a stick 4 by 4 inches. This last named is supposed to be Dutch; and its use would probably have the effect to “roll up” a Maine teamster’s eyes. Now oxen *have* worked, and with considerable results both in Massachusetts and New York.

One of the first objections urged against the use of the yoke as confined to the head, is, that its weight and the bearing of the load is not so easily carried as when brought nearer the shoulders. Very much of our ox-labor in summer is done with the two-wheeled cart. A loaded cart in descending a hill has its centre of gravity thrown forward of the wheels, and that in proportion to the height of the road and the inclination of the grade. Here just where the load bears the heaviest, the yoke is forced against the horns—this yoke of 70 to 100 lbs. ;—the whole weight borne upon the necks often reaching from six to eight cwt. We often see a lazy man seated on the tongue of his cart, thus adding another cwt. to the weight on the necks of his oxen.

But this summer service is tender mercy itself compared with that enacted in winter. We have seen six oxen worked on a sled in a rough forest road. The road is a series of little hills and hollows. The sled rises a hill with the united strength of the team—it balances a moment on the top, then plunges down, and is checked by the horns of the oxen on the tongue. The change of position of this deep yoke, the length of the neck, with the usual slack of the ring on the pole or sled-tongue, gives two feet or more. Here we have the momentum of this moving load of six or ten thousand pounds, unchecked through a space of two, four, or six feet, (for the team is advancing with the sled,) with the trifling addition of this yoke of 75 lbs., all caught on the naked horns of the oxen! and this to be repeated a hundred times in rapid succession, and continued for days and months. Verily! the statute wisely and humanely enacted to apply to such treatment of animals is but a dead letter.

In regard to the French or Spanish yoke, it remains to be tested on our farms, and with our national prejudice against it. It has been considered with us as a remnant of barbarism, only tolerated from necessity, to avoid the use of iron. But we have been repeatedly assured by those returned from California, that oxen move quicker on the road and draw as much with the Spanish yoke as with ours.

We believe that strong and durable yokes may be made of our lightest wood—the native poplar—of less than one-third the weight of those now in use. We believe that a less number of yokes will be required on the farm, as one yoke will near enough fit to oxen of very different sizes; that Yankee ingenuity will readily devise a simple mode of attaching the yoke, so that it may be put on as

quickly as the bow ; that the yoke complete may be made much cheaper, and that oxen can work easier, because more naturally, in them, and exert more force.

Believing all this, we respectfully offer the following :

Resolved, That the importance attaching to Topic No. 5, now before the Board, demands its continuance ; and that it be referred with instructions to test the utility of the Spanish yoke and report at the next session.

In this connection we present to the Board a model for a yoke, embracing our theoretical ideas, hoping it may be fruitful in eliciting thought and utilizing Yankee ingenuity.

Mr. Wasson presented the following report :

Are oats an unduly exhausting crop to seed down with ?

Such is the opinion of many of our best farmers ; an opinion borne out by practical experiments. Is the conclusion arrived at to be relied upon ? Especially in those sections of country, where the seasons are too short and the soil is too sterile to insure paying crops of corn or wheat and where the oat is the only remunerative cereal crop, it becomes a question of more than ordinary interest to know if a paying crop of oats precludes a paying crop of hay.

In 1860, there were grown in Maine 44,149 bushels more of oats than of corn, wheat, rye, barley and buckwheat. In view of this fact, if we have premised correctly, it may well be asked, if the producing of oats is doing for Maine what the raising of tobacco has done for Virginia.

Experience is the result of a series of trials—a summary of facts, those stubborn things, and this fact, of the peculiarity of oats, is not easily to be gainsaid or controverted. So fully impressed are some of our best farmers of its truth, that the oat crop has been abandoned by them, while others equally as certain that a good crop of hay does not succeed a crop of oats, persist in the practice, although their patience is “ tried as by fire.” That most, if not every crop, exhausts the soil, or renders it less productive, is admitted. But oats seem to possess a special power to incapacitate the soil for the growth of the grasses. The laws that govern the growth and nourishment of the grains are wanting in some speciality for this.

As the farming interests of Maine are so dependent upon the hay crop, if the oat is obnoxious to it, the fact should be known and the cause ascertained.

Very many suggestions have been made as to the cause, as that some special fertilizer is wanting—or that the rank growth of the grain on lands in good condition shade and stifle the grass seed—or that some important grass constituent has been abstracted. Even the hypothesis of being a poor economist, has been assumed, of being a gross grower, extravagant in its demands and prodigal of the supply, drawing nourishment from the soil largely in excess of its wants and evaporating of its superabundance.

The chemical analysis of the oat has not suggested the idea of special manuring, neither has practice or experience deduced such an opinion. If some special fertilizer is wanted that the home resources for manure cannot supply, the raising of oats is objectionable, because a majority of farmers are limited to their own areas for plant food. If, then, the suggestion of a fertilizer is correct, science and experience are equally at fault.

That the rank growth of oats on soils in good condition for "seeding down" does, by overshadowing the grass seed prevent its germinating, or if it does vegetate, leaves the tender shoots in such a weak and debilitated condition as to winter-kill, may be true—and for this reason, if no other more potent and objectionable existed, should discontinue the practice of seeding down with this cereal. But it is contended that this is a contingency, rather than a *cause*, for fields sown with buckwheat, the worst of shading crops, take kindly to grass and produce satisfactorily. It is not asserted that grass-seed, with buckwheat or other rank and shading growers, sown in the spring, may not share the same fate as oats. But sown at harvest—sown at nature's time of seeding, while on oat land it is a failure, on buckwheat it is a success. The conclusion, then, is inevitable, that the cause is elsewhere.

One hypothesis is, that the oat—besides being a gross feeder—by some process possesses the power of exuding or excreting some substance obnoxious to grass—or of demoralizing the improbable—or of wasting in the "desert air" what it could not consume. But if theories had been rejected as chimerical and visionary, the world would never have emerged from the "dark ages." Theorists have advanced the idea "that large quantities of silica are taken up by plants as ammonia-silicate, the silica being deposited on the plant—the ammonia thrown off into the air." Of silica, oats consume a large percentage more than wheat. Experiments carefully made for 22 years with wheat, show that of the number of pounds of ammonia annually applied, less than half

of it is given back in the wheat and straw, (some modern writers say that the loss is greater than this,) yet with all this loss, this is comparatively a good grain to seed down with.

That oats as a seeding down crop are excessively exhausting is almost universally conceded. But by what process the soil is incapacitated for the growth of grass, is a mooted question; the full force of which we have realized in being compelled to employ only "arguments drawn from denial."

Farming in Maine is no trifling matter. It is only by economy, foresight and diligence that our farmers can thrive. Their success is contingent upon well-educated and well-directed labor. Hay is the great object of production. Without it, one could farm with as reasonable an expectation of success in the frozen regions of Grinnell's Land, or on the parching wastes of the American Desert as in the Dirigo State. It is the crop of all crops. The Alpha and Omega to which all others are subordinate and secondary. The whole routine of cultivation, its object, aim and end, all subserve to this one purpose—the *production of hay*—hence the value and importance of a knowledge of the habits, wants and fitness of the preparatory crops, root or cereal, those which less fit and capacitate the soil, and those which from cause or causes, known or unknown, are injurious.

In closing, it may well be asked, *Is the oat the worst of cereals to seed down with?* If not, why such a wide spread opinion. If the allegation be true, what is the cause, and how can it be obviated?

Mr. Jeffers submitted the following on.

Winter care of farm stock.

For nearly six months of the year the principal business of the farmer in Maine is the care of his domestic animals; and on the skill, care and judgment exercised depends his success.

The object of the stock grower is to obtain the most valuable returns for his vegetable products, and in order to do this, his animals must be made comfortable, protected from cold, sheltered from storms, exempted from hard usage, breathing pure air, drinking wholesome water, and licking salt as often and as much, as nature craves; never filthy for want of a place to keep dry and clean, and regularly fed with proper food, and at the proper time. Protection from cold is essential to the profitable keeping of stock, and the want of it, one of the great sources of loss to the farmer.

I will hazard the assertion that there is not one barn in ten, take the State through, (and I think that much below the number,) but that the loss from cold (which with little expense might be avoided) is more than twenty per cent. the cost of keeping. It is astonishing to look into the stables through the country, and see how miserably animals are housed in this cold climate. Barns with a few cobble stones for underpinning, or oftener none at all, so the wind has full sweep under them; cracks between the boarding render windows unnecessary. Now this is sheer shiftlessness; if he has not the means to make permanent improvement, he can with a few hours labor in the fall, bank up with earth or boughs, and with a few boards and nails, can divide and batten from the rest of the barn a stable comparatively warm and comfortable. The dictates of humanity as well as of interest demand that our animals should have better care. In many cases the owner had better sell a part of his hay, or better still his stock, to pay for labor and material to make his stable comfortable; the remainder would produce more income, beside the pleasure of seeing sleek, straight and lively animals, rather than bent like a new moon, with all four feet on the surface of a peck measure, and with each individual hair standing out by itself like a brush broom. Allowing stock to remain exposed to the autumn rains, and the frosty nights of October and November is a source of loss the extent of which but few farmers realize; their coat is thickening up for winter, so their loss of condition is not noticed.

At this season they need particular care, for if they lose flesh then, they will continue to do so all winter unless they have extra care, but if they are brought well into the winter in good heart, they will have good appetites to stand quite indifferent fare; especially is this the case with sheep and colts which are most neglected at this season. A fat strong animal will be warm and comfortable where a weak one will hardly live, and a hearty, vigorous one will digest and assimilate food which the weak one will hardly taste. Water in a convenient sheltered place, is another very essential thing in the winter management of stock, and one that is very much neglected. On many farms the time spent in driving cattle to water, and keeping the road open, would furnish water in the yard, to say nothing of the saving in manure and condition of the animals, which would be as much more. Cattle that go a long distance to water, are always unwilling to go in the coldest weather, and when driven, often refuse to drink, until

they become so thirsty that they drink too much. Cattle and horses will drink twice a day, if the water is convenient, and sheltered from the cold winds. The practice of leaving cattle in the open air through the day, and feeding at noon in the yard, is fast going out of date; still it is practised to some extent, and the argument in favor of it is, that they will eat coarse fodder, such as they would not in the barn. Now this economy is about the same as opening the doors and windows of a house in order to burn green wood; no doubt he could burn more wood, but to be more comfortable would be quite another thing; they would eat a rail fence in their endeavors to get away. A large portion of the food consumed in cold weather goes to keep up animal warmth, therefore they gorge themselves with coarse food, impairing their digestive organs, and laying the seeds for future disease. There are but few days from December to April in which an animal will not suffer by being in the open air, unless in exercise, and the practice of turning them out at eight o'clock in the morning, and leaving them until four in the afternoon, is inhuman, beside the loss, which is considerable; for with the melting snows and hot sun of spring a large portion of the droppings in the yard are wasted. Feeding requires the nicest tact and judgment, and must be varied according to circumstances, and the object to be attained. Still, there are general rules and principles which hold good in all cases; and one is regularity, i. e., at stated hours and in stated quantities; not gorged one day, and half starved the next. The observing herdsman will soon learn what each animal requires, and feed accordingly. He will understand the taste and appetite of each, as the good housekeeper does that of her family. The economy of cutting and steaming fodder, the amount of grain and the sorts to be fed, depends upon circumstances of location, price of labor, hay, and the object of feeding. Animals cannot be expected to give a quantity of milk, or lay on flesh, unless they have something to make it from.

It is the practice of many to feed all their straw and coarse fodder during the first of the winter, keeping their good hay until the last. Now if they must feed it in one part of the season, it would be better to reverse this practice, and feed the good hay first. Stock of all kinds, when it comes to the barn, should have good early cut hay and a few roots, and if straw is to be eaten as a principal food by any part of the stock, they should be put upon it by degrees. If my stock is to lose condition, let it be in the

spring, for then they will sooner recover. Our long winters require that everything which cattle will eat should be used to eke out our hay, and especially in such seasons as that of 1864, when the drought cut down our forage one-third, and the farmer found the market so glutted with stock that he must either sell at a loss, or get them through as best he might. A large amount of coarse fodder might be used instead of hay, by feeding a few roots or a little meal. As a general thing, milch cows, working oxen, horses and breeding sheep, should have the best of hay. Cows, sheep, and oxen when not at work, may have one feed a day of straw. They will often relish it as a change. The stocks of coarse hay left by sheep and cattle will be eaten by colts. Straw and rough fodder may be fed to young stock to advantage if fed in connection with a little nutritious food. A daily allowance of a little first class hay, a sprinkling of meal, or a few roots, will keep them in good heart, and although they may look a little gaunt they will be in good spirits and gain rapidly when turned to pasture in the spring. Thrifty two-years-old steers of good growing breeds, when fed in this way will gain at grass from ten to fifteen inches in girth. Young stock that are fed with concentrated food so as to fatten them in winter, will not do as well at grass, as those that are only kept growing; so the excess of food over that required to keep them in a growing condition is thrown away. I have frequently seen this where such stock have been pastured together. The largest growth can be obtained in the shortest time, by feeding good succulent food, enough to keep them growing, and not enough to make them excessively fat. But with our practice of keeping mixed stock, I think it more profitable to feed rough fodder to such stock, and depend on the feed of the pasture for their growth, although they may not attain it quite as young.

It may seem that their feed had been lost to find them no larger in the spring than they were in the fall; the food consumed is of little worth for other stock, and if they are in good health and have good pasture, not overstocked, they will make a handsome return in the fall.

Animals should have their regular meals and be kept eating until filled, and then left in quiet until the next hour for feeding. It is better to give them their meal at two or more feedings, than to give it all at once, for when a large quantity is given, they pick it over and it becomes foul with their breath. and they will not eat it as clean as when fed in small quantities. Their cribs should be

cleaned once a day at least. The hours of feeding must be governed by circumstances, as those who have the care of stock often have other work to do. It is better not to feed very early in the morning, or late at night. They should not be disturbed after they lie down for the night.

Salt should be furnished regularly. It is best to have it in some convenient place, if possible, near their watering place, where they can get it when they please, if not, it should be given them as often as once a week, unless they are fed salt hay, when a change from English to salt hay will do as well.

Kind treatment has much to do with the profitable management of stock. An irritable man or boy, who has the care of it, will take more from a stock of cattle than a feed of grain a day, while he will make the animal vicious and uncomfortable to handle, and thereby lessen their value, by abuse. This abuse is oftener the result of thoughtlessness or habit than wanton cruelty. He forgets that the animal is not endowed with reason, and acting from instinct himself, becomes the greater brute.

God has given them for our use, and we are responsible for them. One of the first lessons to the boy in the care of domestic animals should be, to treat them kindly. Hired help should never be allowed to thrash and kick the animals he has in charge. If he does so in the absence of the owner, they will report the fact when he makes them a visit, as plainly as if they could speak. Any one can tell by going among a stock of cattle whether they have received kind usage.

Experience and observation have taught me that by greater attention to the comfort of our domestic animals, and better care in feeding, we may obtain larger profits from our crops, (which we labor so hard to get,) than we now do by our careless haphazard management.

Mr. French presented the following on

The cultivation of rural taste, architecture, &c.

It may be assumed as one of the great facts of civilization that a people are refined and cultivated in proportion as they improve the privileges at their command and make the most of their surroundings. There is no country so devoid of natural beauty or so rich in varied scenery, but that art can heighten the effect of the landscape. Tourists, in their notes of travel in the lands of our ancestors, give glowing descriptions of the ancient domain, where

nature and art combined produce a picture "rich and rare," but our people need not go abroad to seek for rural pleasures, our own country and perhaps our own homes have natural attractions and natural beauties equal to any—taste and art alone are wanting to produce the effect.

As yet there is to be seen among us but little of landscape gardening, except around our cities, and occasionally an individual instance to be met with, but the little already accomplished shows how much may be done when the means are applied.

Our efforts at rural embellishment are principally confined to persons with large means at their command, who are able to avail themselves of the services of experienced gardeners, but we desire that our entire rural population shall engage in the agreeable occupation of rural art. We do not propose that much be done at once, but that each adapt him or herself to their circumstances, and little by little improve and add to the charms nature has lent them. The rich and costly embellishments, where wealth luxuriates in gardens of rare and beautiful flowers or strolls in woods mid artificial rocks and waterfalls, are not to be imitated; these please more than they instruct; we want the exercise of those simple tastes that give real pleasure. Let each be content to make the most of what he has, be it a shady dell, or cosy nook, or rugged rock, or purling brook, or copse of wood, or waterfall; and each contributing his mite thus shall help to form an endlessly varying scene, pleasing to the eye, refining to the taste, and agreeable to the senses; exerting an influence from which none can escape, a school in which all will be taught.

The farmer, be his circumstances what they may, has ample opportunity for the exercise of rural tastes. His dwelling, his field, his pasture, his wood, may be the constant objects of embellishment and improvement, and a life-long pleasure realized in doing it. Farmers as a class do not realize that there may be a pleasure in life and labor as well as a profit, and that their occupation above all others is best fitted to enjoy the substantial comforts of life.

Let every farmer's home be made attractive, and endeared to its occupants by association with whatever renders it pleasant as a home, be it a tree, or a vine, or garden. I speak now of immediate surroundings; these can all be had for their planting, and afterwards they will grow with us and for us, and be of us. If situation favors, he should take into consideration more distant

objects and their relation to the *view* around his house, and study to produce the greatest effect by their combination. What tree shall be used for ornamentation and how applied, individual tastes must decide. If the shade trees and vines be fruit bearing, we do not object, we rather commend it; it will be pleasure and profit combined, and as a first step may have much to do in removing the prejudices many farmers and others cherish against such improvements. Our fruit trees may be trained in symmetrical forms, and their flower, and leaf and fruit are attractive, agreeable and enjoyable, and *all* in turn may be served by them.

The farmer can add much to the beauty of his farm and the convenience of his labor by having his fields laid out in regular form, having reference to the amount of land he annually cultivates. It is better to have all his labor confined to one spot than to be running all over the farm after his work, but it is not *always* practicable, as his fields may be so situated that a suitable division cannot be made, but in most cases it can be reduced to two or at most three parcels for a summer's work. A farm thus cultivated makes a favorable impression upon even the casual observer, and if a man thus begins in a systematic arrangement of his labor, it will soon pervade all his operations.

A field need not necessarily be square or rectangular to accomplish this; it may be applied to any irregular shapes, and if there be waste spots, as rock or ledge, or swale, they may all be made to combine in the improvements. This is emphatically true of large boulders or outcropping ledges,—cover them with vines and the grape will flourish by their sides and ripen its fruit on their warm surfaces.

The pasture, so generally overrun and neglected, may be made attractive by a tree here and there in favorable spots, under which the cattle may find a grateful shade in a hot summer day. We knew a man once to cut down the widest-spreading ash we ever saw because his cattle sought shelter beneath it from the hot sun, when he thought they ought to be out feeding. We do not advocate much shade in our pastures, rather the contrary, and that only where the excrements left under the trees may be dissolved and washed over the grass land by the snows and rains.

The wood lot affords abundant room for following out suggestions already made. The farmer from necessity has his "wood roads," and they may be made comfortable and *permanent* as other farm roads, and if the lot is neatly kept and all parts accessible, a

stroll in it may afford both pleasure and comfort to the farmer's family akin to that enjoyed in the rich man's forest or grove. The "sugar berth," if the farmer have one, and every farmer may thus provide, can be as really an ornament to his place as the shade tree he plants before his door.

The road-side presents advantages that should not be overlooked, and instead of the bushes and briars we so often see, let the tree and shrub that spring up there naturally be cultivated, and fruit and shade trees fill up the waste places, and especially those kinds that shall make ample returns for the labor bestowed. In this way the whole face of the country may present a pleasing and cultivated aspect, and the traveller's eye rest continually on an ever-varying picture.

Thus much with regard to the improvement of rural tastes and pleasures. Let us glance at the homes of the million. As yet our architecture in the country has no name, deserves none; it is not classic, it does not belong to the "orders," it is hermaphrodite; a jumbling together of whatever pleases the carpenter's fancy, without regard to rule, and oftentimes in gross violation of good taste. Occasionally there is to be met with a princely mansion of the provincial days, raised by some "good old English gentleman," and copied from patrician Rome, but these are fast going to decay, or being transformed into what is termed "modern style."

Our houses, as seen in the country, are very much alike, one copied from another, except now and then an innovation in the shape of a steeple roof, or an attempt at a Gothic cottage with nothing gothic about it except its irregularity of form. It is not a strict adherence to *style* that is necessary to improve our rural dwellings, but the exercise of good taste in their construction and arrangement; the execution of some well-devised plan.

A man begins to build a house without knowing *just* what he wants, and as he discovers its deficiencies adds on piece after piece, "ell and porch," till instead of a house he has a kind of rope-walk structure with no harmony of design, and disfiguring the comely parts of the original structure. We have one consolation when looking upon such deformities: they are of wood, and the fire may devour them, or they will eventually go to decay.

Our people want to learn that it costs no more to build a neat and commodious dwelling in the aggregate than it does to pursue the hap-hazard way so much in vogue among us, and the influence

it exerts on the home thus made, ten-fold more than pays the cost. And another thing we would have taken into account; we build of *too* perishable materials in this land of hemlock, spruce and pine; our homes will not become ancestral till more firmly established.

We hope the time is coming when more durable substances will be employed in the construction of farm-houses and country residences; when stone, and brick, and concrete will build up the external walls. One or the other of these materials exist in almost any section, and taking a life-time into account, their expense is not so much greater as is supposed. It is not necessary that country houses be castles with suits of "spare rooms;" less pretentious, more commodious and permanent, should be the rule, our means governing in each particular, and if necessary, a series of years may be consumed in preparation.

The Grecian and Roman styles of architecture are not to be imitated in the country. They were devised by rules of art to be used where art alone gives effect, and are not suited to the endless variety of form and peculiarities of situation that control in rural architecture. The Gothic is always available, always appropriate, but is too expensive to be indulged in except by persons with ample means to do it justice.

What is known as the Tudor style, is so thoroughly English in its composition, so full of resource, so easily applied in any situation, and so well adapted to permanent construction, that it deserves to be the favorite in rural architecture. There is a home look about it that satisfies at once, and it is sufficiently pretentious to answer almost any requirement. It sprang from the necessities of the English people, is in fact the only style ever originated by us, and whatever modification it may undergo, will long continue to be the true representative of the Anglo-Saxon home.

We do not advocate a radical change in what we have endeavored to call attention to, but propose that it be gradual, that the people educate themselves in what pertains to pleasure and art, as well as labor and profit; that our dwellings become homes where rational and intelligent beings live, not stay; that we improve upon nature, instead of borrowing from it, till in the future, not far remote, our whole country shall be rich in landscape views or exhibitions of rural art, and the whole people dwell in gardens, beautiful as that primitive one in which lived the first pair,

and bearing all manner of fruit, not excepting the "tree of knowledge."

The Business Committee reported the following topics for consideration at this session, to which chairmen of committees were appointed as follows :

1. What lessons in agriculture are taught by the peculiar circumstances of the past four years? Chamberlain, of Maine State Society.

2. Ought the more extensive cultivation of peas, as a sure crop, and beans, as a *valuable* crop, to be recommended? Anderson, of Cumberland.

3. Should measures additional to the act of Congress be adopted by the State to secure immunity from the cattle plague now prevailing in Europe? Wasson, of Hancock.

4. Which of the products of the farm should be exchanged for other commodities of life, or sold off the farm? Prince, of Androscoggin.

5. Can farming in Maine be conducted with success as compared with other branches of industry? Smith, of Penobscot.

6. The best construction of farm buildings, with reference to their convenience and adaptability to all the requirements of the farm. French, of Franklin.

7. On which can a farmer live the easier—on a farm of two hundred acres or more, or on one of forty or fifty—the soil of like quality? Carpenter, of Kennebec.

8. Ought the Board, while regarding the fearfully increasing pests to our vegetation, to recommend the appointment of a State Entomologist? Wasson, of Hancock.

9. To consider the practicability and expediency of transferring the labors and duties of the Board of Agriculture to the Agricultural College whenever the same may go into effectual operation, in order to have one central agency for the promotion of agriculture in the State. Goodale, of York.

10. Can effective measures be adopted to increase the hay crop, without the use of barn manure or concentrated fertilizers? Bigelow, of Somerset.

11. Should the use of horses be encouraged to the exclusion of oxen for farm labor? Jeffers, of Piscataquis.

Mr. Chamberlain presented the following report on Topic No. 1:

What lessons in agriculture are taught by the peculiar circumstances of the past four years?

LESSON 1st. Agriculture has improved her social relations with her more accomplished sister—*horticulture*—in seeking her advice and considering her precepts. The reduced numbers of our domestic animals, and the consequent advance in the price of meats, tend to its reduced consumption under the dictates of a compulsory economy. We believe that a mixed diet is better in our climate than a purely vegetable one; but if our future shall be a sensible departure from former habit as gross flesh eaters, that future will be blest through it.

An important and growing interest in this country is the production of garden vegetables and small fruits. This production concerns every land owner, as affecting the health, comfort and thrift of his family. This interest has increased by a much larger ratio than has the population, and far greater than that of the three important staples of butter, potatoes and Indian corn. The increase in the productions of the market gardens of the three States—Massachusetts, New York and New Jersey—was more than 100 per cent. in each of the last two decades. This ratio of increase, accelerated since 1860, with the facts applicable to so many of the States, is instructive. It indicates the direction our industry is to take as the resources of the country become further developed. After acknowledging all the proper claims of grass, hay and the grain crops, the produce of our orchards and gardens should be considered as a very important interest, and one of increasing value. Our climate matures a very great variety of delicious and nourishing vegetables and fruits to supply our tables from early summer to late autumn. Another class succeeds and supplies us for the other half of the year. These, with the products from our cows and our poultry, enable the American farmer to live better than any other people. If he is not seen to do so, he cannot blame our skies nor our soil.

LESSON 2d. It is very certain that the state of any art is intimately connected with that of its instruments. If these are imperfect, it cannot be much advanced, and this is so universally the case, that agriculture is no exception. Having taken another lesson from the horticulturist, the farmer, short handed, concentrates his operations and improves on their thoroughness. He

manifests an increased anxiety to avail himself of all aids in the way of improved implements. This matter of improved implements having been treated in an extended article at a former session, we may be excused from entering upon it in this connection, further than to name it as the lesson of the hour—a lesson that will remain a practical one when the country shall have been restored to its normal condition of affairs, and one to endure through our nation's future.

When farm labor and farm products shall be cheapened through the subsidence of disturbed elements, when our people shall have relieved themselves from onerous burthens, when domestic tranquillity shall everywhere prevail, any provision that may have been made for rapid and efficient conduct of general farm operations through a liberal investment in improved implements, will serve the purpose to save to the farmer in the more prudent expenditure of his own physical force, and leave to him time, ability and inclination to cultivate his own mind, and provide the same inestimable advantages for those dependent upon him. Thus may we read the lessons of the hour, believing there is much good in store for us and for our country, and that we shall receive of it in full measure as we prove ourselves worthy of it.

Mr. Anderson submitted the following report on Topic No. 2:

Ought the more extensive culture of peas and beans to be recommended?

It has, for years, impressed the mind of your committee that a most important point in practical and economical farming in Maine is to provide for some sure and abundant crop which may be readily *and directly* converted into human and animal food, without the necessity of carrying it to the mill or market for either transformation or exchange. Something which may be grown cheaply as regards not only labor, but also, by not drawing heavily upon the riches of the soil and consuming too rapidly the treasure on deposit there; thus truly husbanding our resources, at the same time allowing us to feel that we can well afford its free or lavish consumption. Every farmer knows the importance of having a good supply of some sort of concentrated food at his command. But it seems as if too much dependence was placed upon that one most exacting of labor and requiring of fertilizers—Indian corn—and the other exhaustive cereals—wheat, barley, and oats. And that too little regard is given to those leguminous plants which

form the subject of the topic assigned to your committee. In the agricultural branch of the Eighth Census Report, one of the most valuable agricultural contributions yet exhibited by any department of our General Government—we find the following: “With the exception of flax and decorticated cotton seed, peas and beans contain more nitrogen than any other grain. The droppings of animals fed on peas and beans are consequently more valuable than that from animals fed on any other grain. The growth of these crops when fed on the farm increases the fertility more than any other grain crops. When consumed on the farm and the manure returned to the land, or when ploughed under as a manure, peas may be considered as a renovating crop. As a crop to alternate with wheat, peas are exceedingly useful. They tax the soil but lightly, and when a heavy crop is produced they smother the weeds. They also ripen early enough to afford ample time to sow wheat after the peas are harvested.” In the same report, Mr. Kennedy also says: “The great want of American agriculture is a plant which shall occupy in our system of rotation the place which the turnip occupies in British agriculture. We have no such crop. The bean at the north has more of the necessary qualities than any other plant extensively cultivated. It is planted in rows and admits the use of the horse-hoe in cleaning the land. It does not draw heavily on the soil, and contains a large amount of nitrogen, the element which the cereals so much need.”

Here certainly we find much that we want, so much that it undoubtedly would warrant a wider cultivation than it has yet received. Although Maine raises more peas and beans than all the other New England States, (246,915 bushels,) the total of these two crops in New England is less than half a million bushels. And we have no doubt it might be introduced quite liberally into the food of our domestic animals in this country, as one species, the horse bean, has for years formed a very important part in the feeding of horses, neat cattle, sheep and swine in Great Britain; entering largely into the composition of all those commercial articles so widely advertised, and to a very considerable extent used, under the name of this or that man's *feed*,—Horsfall's being perhaps the one most generally known. While we acknowledge the great value of the bean, and would urge its more extended culture in the field, there is too much uncertainty about the crop; from its tenderness and liability to serious injury from frost, and the attacks of worms and insects, and from rust, for us to rest



Short Horn Heifer "LADY MARY," at one year old.

The property of H. G. White, South Framingham, Mass. Red (white star). Calved January 27, 1864. Got by Hotspur, 4030, [see note], out of Baroness by Barrington, 1229—Red Rose, 2d, by Napier (6238)—Tube Rose by South Durham (5281)—Rose Ann by Bellerophon (3119)—Rosette by Belvedere (1706)—Red Rose by Waterloo (2816)—Moss Rose by Baron (58)—Angelina by Phlegomenon (491)—Anne Boleyn by Favorite (252)—Princess by Favorite (252)—Brighteyes by Favorite (252)—by Hubback (319)—by Snowden's bull (612)—by Masterman's bull (422)—by Harrison's bull (592)—by the Studley bull (606).
 NORG. Hotspur, 4030—bred by Mr. Harrison. Got by imported Duke of Gloster (11382) out of imported Daphne by Harold (10299)—Limpud by Viceroy (7675)—Lemon by Marquis (2271)—Lowly by Isaac (11299)—Lisette by Blucher (83)—Lady by Cecil (120).
 Lady Mary was winner of Silver Medal, Sweepstakes open to all comers, and also first prize as yearling at the show of the New England Agricultural Society, at Concord, N. H., in 1866. Her sire Hotspur, 4030, received first prize at the show of the New York State Agricultural Society, in 1863.

here in search after that material aid to which we may confidently trust as one of the principal supports in a proper system of husbandry. But may we not find all the required qualities and conditions in the pea?

With proper care and the simplest means all its enemies can be guarded against. It is among the hardiest of our plants. It will produce according to culture from five to fifteen bushels to one of sowing, of food adapted to the use of every living creature which properly belongs upon the farm; and except hay, is perhaps less liable to injury and loss from storage than any of our crops.

This topic which has been assigned to your committee in the form of a query, seems to us an eminently practical question; one which cannot be satisfactorily treated in any merely speculative way, and although we ask leave to submit hereafter, to add to and form part of this paper when complete, such analysis of the two plants named in the topic, and other extracts from the writings of more able men about them, as we have thought might add interest and perhaps instruction to a more deliberate study of the subject matter, yet we desire to so fashion this preliminary report as to court and elicit the freest criticisms from members of the Board, animated by the desire to counsel their brother farmers well, and controlled by the knowledge they have derived from actual experience and observation. The conclusion to which your Committee have arrived is that the Board of Agriculture should

Resolve, That the largest practical cultivation of the pea cannot be too thoroughly urged upon every farmer in Maine, as one of the surest crops that he can grow, and every way a remunerative one; and that a much greater breadth of land than has yet been given to it might be very profitably devoted to the bean crop.

Mr. Wasson submitted the following report on Topic No. 3:

Should measures additional to the act of Congress be adopted to secure immunity from the cattle plague?

To show the necessity of "means additional," a brief expose of the history and character of the rinderpest is required.

This disease, which is now raging so fatally in England, and that has baffled every attempt to check its progress, is of all infectious diseases the most to be feared. Every precaution should be taken without delay to prevent its introduction to this continent. Once with a foothold here, none can foresee the consequences.

The disease is known in England as the cattle plague, in France as *typhus contagieux*, in Germany as the rinderpest.

The disease first appeared among the cattle inhabiting the *steppes* or treeless plains in the southeast of Russia. From the 47th to the 55th parallels of latitude, the Volga, Don and Dneiper rivers, with their numerous tributaries, flow leisurely through a vast plain of rich soil, occasionally overflowing the lands, causing a luxuriant vegetation. Here stock is abundant, with no winter food provided, as in California. Here rinderpest originated.

The pleuro-pneumonia is well said to be a most formidable disease, destroying as it did in Holland \$660,000 worth of cattle in a single year, and in two years more than 28,000 animals. But rinderpest in England in the month of November last destroyed 5000 head, and later reports show that 50,000 animals have died in England within the past six months; a number equal to 17 *per cent.* of the cattle in Maine.

Of the character of this disease it is said "that in all cases which tend to a fatal termination the animals rarely live beyond the fourth day. Many die the second day. The greater number die the third day. The deaths number about 90 *per cent.* The nature of the disease seems closely allied to spotted fever—a poisoning of the blood. An English paper says, "nothing can be more fallacious than the supposition that the disease is curable." The experience gained in England confirms that of Europe as a whole, that medical skill is powerless in arresting its progress. The homœopathic theory of curing diseases brightened the gloomy prospect for a few weeks. But even that gleam of hope has been blasted; the treatment proved an utter failure. It is one of the most infectious maladies of which we have any experience. It is capable of being conveyed from animal to animal by persons and articles of clothing. On one of the estates in Austria where the cattle were diseased, a carpenter's apprentice employed on the estate escaped the vigilance of the guards and went to his father's house, which was distant about a mile. While there he repaired his father's cattle stall, and also changed his clothes. The rinderpest, in consequence of this, broke out among his father's cattle, and all were destroyed.

One of the worst features of the disease is, that animals appear perfectly healthy so long after they are infected; for it is said the disease may lie *dormant* in the system as long as fourteen days

before any symptoms are seen—a length of time equal to that of a voyage from Europe.

After medical skill had exhausted itself in vain attempts to combat the disease, recourse to military *cordons* established by government was had. Wherever the disease broke out, the diseased cattle were slaughtered by order of the government, and a military *cordon* drawn around the place. All dogs, cats, rabbits, domestic poultry, pigeons, &c., have to be kept in places of security and close confinement. If the disease exists in a village through which a high road runs, the course of the road is turned if possible; but when this is not practicable, then a guard accompanies the several travellers who arrive at the boundaries of the *cordon* to see that they do not go upon any of the infected premises. The *cordon* is frequently maintained by the peasants, but none are taken for this purpose from an infected village, the selection being made from contiguous villages or farms where the cattle are healthy.

“As soon as the malady is observed in a commune, notices are sent to all the surrounding places, that precautionary measures may be immediately adopted by the owners of cattle. Each commune has to provide a place for the burial of the animals which die or are slaughtered, and also a wagon and horses to carry them upon; and on the disease passing away the wagon is burned and the horses washed with a solution of chloride of lime. The place of interment is likewise enclosed, and not allowed to be disturbed for several years.”

In spite of all these energetic measures, this malignant disease has visited nearly every country in Europe.

It was imported into Holland. It was imported into England. And if ever introduced into this country, it will be by that same agency—*importation*.

Once here, the die is cast, and a loss of millions of dollars worth of cattle the result.

The means of communication between us and England have become so rapid and so easy, that her relative position on the globe has been changed, bringing her, commercially considered, to our very doors. In that regard, as well as geographically considered, Maine, of all the States, is her nearest neighbor. Our thousand miles of sea-coast, with its capacious and inviting harbors bordering upon the great “highway of nations,” expose us in a pre-eminent degree to danger. Like the outer ledges upon her coast,

she is first in the way. With the province of New Brunswick belting our eastern frontier, the Canadas contiguous on our northern and northwestern sides, adding immensely to increase our exposure, and railroads, having a foreign terminus, intersecting the State at several points—prospectively at least—including numerous other over-land channels of communication, all demand “additional measures to secure immunity from the cattle plague.” From the Grand Falls to the mouth of the St. Croix, the boundary line of the State, at each point of ingress or egress is simply a *mathematical* point. The communication across the “line” is as perfect and unbroken, and the social relations of every day life are as closely interwoven, as in neighborhoods more remote from that line.

Here is contact, social daily contact, an extended line for *communication* by contact, an intercourse that “acts” and edicts are powerless to interclude, until into those relations can be incorporated a wholesome regard for the observance of such laws, until each, united by common interest or danger, becomes a law unto himself. This is a subject for alarm, for genuine alarm. We just learn that the disease has broken out in the Zoological Garden in Paris, and the goats as well as sheep and cattle are dying. Mr. Clay, the American Minister, writing recently from St. Petersburg, says, “the cattle are dying by hundreds and the sheep by thousands.”

The foreign files, by every arrival, are still repeating the story of unabating malignity, of new and extending conquests, in spite of sanitary measures and medicinal skill, thus affording fresh fuel to kindle agitation in the public mind. Here is our security in maintaining a thorough and an efficient blockade, an absolute prohibition of traffic, in animals, or any and everything appertaining to them, or that has been in contact with them.

The following preamble and resolve accompanying the report were adopted :

Whereas, A malignant disease is making fearful ravages among the cattle and sheep of England and other countries of Europe—and *whereas* said disease or plague is easily communicated by contact—and *whereas* Maine, from its geographical position, is more exposed than any other of the States—and *whereas* in the opinion of members of this Board, measures additional to the act

of Congress are required to secure immunity from said disease or plague ;

Resolved, That the Governor and Council be requested to take immediate action in the premises, by correspondence with the local Governments of the British North American Provinces, contiguous to this State, and invite their co-operation to the same end.

Mr. Prince submitted the following report on Topic No. 4 :

What products can be sold to go off the farm with the least detriment to its fertility, and at the same time be profitable to the producer ?

The above is without doubt one of the most important questions that can be asked the farmers of Maine, as we cannot, like those of the western prairies, keep up the productiveness of our farms, without replenishing them with some kind of fertilizers, and we believe that the large body of our farmers will agree with us when we say that we must rely mainly upon home manufacture rather than such concentrated fertilizers as are usually sold to our farmers ; not but what great benefit is many times derived from these fertilizers, but that they cannot be counted on as sure of producing the desired effect.

We have so many different varieties of soils, that what would be considered a good system of farming in one locality would inevitably result in a failure in another. Still, there are some general principles that can be laid down, by which we can all be governed—principles that will hold good upon all soils and in any part of our State. One of these is, never sell any corn, grain, or hay from our farms, except perhaps near the seacoast, where an unlimited supply of dressing may be obtained without money and without price. All the crops of our farms should be consumed upon them. Another principle should be, never let a season pass without making a strong effort to increase your fruit crop, as some of the different varieties can be raised and sold from any soil in Maine, and the land at the same time be kept in good condition, with a small outlay for mulching that can be obtained in almost unlimited supply in any locality. The apple and pear can be raised on any of our gravelly soils in any part of our State, with a profit that would rival even the fabulous stories of profitable crops of the great West.

Many of the earlier varieties of grapes are now becoming a sure and most profitable crop on almost any soil that is well dressed,

and we would recommend that our farmers should give more attention to their cultivation. There are but very few farms but what have some swampy place where cranberries can be grown with even greater profit than any other crop, and that too without any outlay after the vines are once well set. Will not our farmers look around and see if they have not some deserted spot on their farms that is now an eye-sore to them, that can be turned to good account with this crop? We are satisfied that although our fruit crop has more enemies to contend with than formerly, it can now be made the most profitable and least exhaustive of any that can be raised in Maine.

Fruit being the leading branch, we must ascertain what live stock is best adapted to our location, not only returning us good profit at present, but keeping our farms in good condition. On one that has a pasture that grows a good quantity of rich nutritive grasses, and cuts a large proportion of good English hay, the cow should undoubtedly take the lead, as from the refuse of the dairy swine can be kept, and with the two combined with judicious management, a farm can not only be prevented from deteriorating, but made to improve in productiveness. But a farm that cuts a large proportion of swale or meadow hay, it is folly to think can be made profitable as a dairy farm, for cows must not only have good pasturage in summer, but good English hay, with meal, roots, or, what is better, swill, in winter. On the dairy farm, we would mulch the orchard as far as the limbs of the trees extend, and as soon as the apples begin to drop from the trees, turn in the store pigs, that they may pick them up, to prevent their being a nursery for pests for succeeding years.

On a farm that cuts a large proportion of poor hay, sheep should be the leading stock, as they can be kept in good condition through the winter on very poor hay with the addition of a few roots or refuse apples, daily, and although a farm cannot be kept in as good condition with sheep as with cows, it can be equally as good as in rearing neat stock, and at the same time be a source of much greater profit to the owners. Your orchard, too, can be pastured with sheep, after the trees attain to a size large enough, so that they will not be injured by them. We think that any one following the course pointed out above, and selling his fruit, butter and cheese, or wool, as the case may be, can not only make farming remunerative at present, but add yearly to the productiveness of his farm.

Mr. Smith submitted the following on Topic No. 5 :

Can farming in Maine be conducted with success as compared with other branches of industry?

A great many things in this world are taken for granted ; the faith of one is too often pinned to the sleeve of another. Opinions are formed without investigation ; certain notions are gathered from casual observation. There is a certain amount of jumping at conclusions. In some or in all of the ways thus indicated, may not the opinion, so freely expressed, have obtained that the field of agriculture is less inviting than that of any of the other industrial interests. If it be true that farming is not a paying business as compared with the other branches of industry, are there not other causes or surroundings, to which the default is chargeable, locality, mismanagement, want of interest, or a divided interest. A farmer, to succeed, must love his calling, and devote both his time and attention to it.

It is said that but about one in thirty succeed of those engaged in lumbering. How untrue of farming. In mercantile life or in manufactures, the number of those who acquire a competency is believed to be far less than those who reach the same results as farmers.

But few perhaps are aware of the amount of capital invested in agriculture in our own State. But few would suppose that sum to be what it is, \$97,424,385 ; and this large sum is paying a dividend yearly of more than 14 per cent. ; the orchard products alone foot up the neat little sum of \$501,767. Now we have not the means of knowing the amount invested in other avocations, but we feel safe in saying, that the investments in farming will not suffer in the comparison. If it be true, and true it is, that the business of farming is paying 14 *per cent.* on a dollar, we can confidently say to our young men, here in Maine is as inviting a field as elsewhere, and farming in Maine is as lucrative and as promising a business as any other. And in view of the facts herein presented, we say to our brother farmers, push on your enterprises, your calling is not only honorable but profitable. Your investments in your business are paying as good a dividend as the other branches of business in the State.

Mr. Carpenter presented the following report on Topic No. 7 :

On which can a farmer live the easier, on a farm of two hundred acres or more, or one of forty or fifty; the soil of like quality?

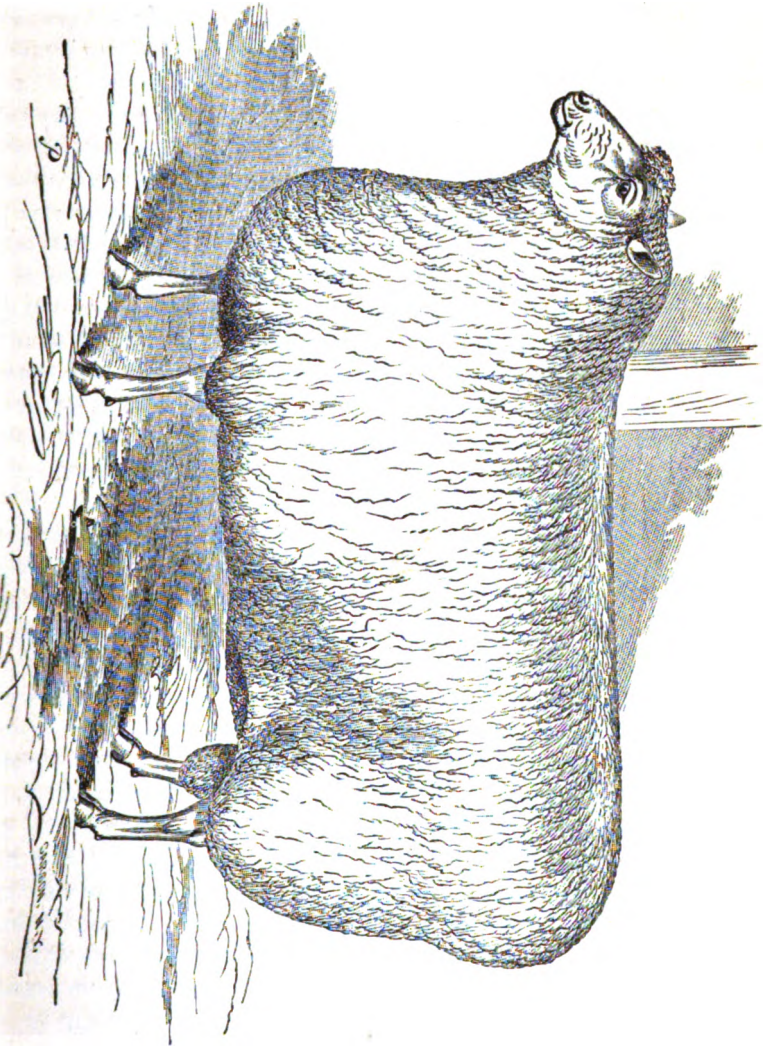
Here is something that cannot be weighed or measured, and we shall be obliged to exercise one of the rights conceded to the people of this section of our country, and resort to some "guessing," in order to arrive at a probable solution of this, to the farmers of Maine, important question.

In making a comparison, it is assumed that the circumstances of the farmer are the same so far as the family and location are concerned, and also equal as to skill and ability to labor in the prosecution of his business. It is understood that the style of living in both instances is to correspond. The buildings on the two farms will be equally plain or expensive, according to the taste or ability of the occupants, and the outlay would be the same, with this exception, that the larger farm will require the addition of barn room sufficient to house the stock and crops.

We frequently hear remarks of this kind: "You have too much land, enough for two farms; why not divide it, or sell out and buy a small place where you can live easier?" And on the other hand, it is common to hear something that sounds more complaining: "I can do but little for a living on this small farm of only forty acres. I have a large family, and it takes about all we can produce to live on." Everything produced on the farm and consumed by the family is worth what it would cost in the market, adding thereto the expense of transportation. The farmer that comes the nearest to living within himself may in the end, we believe, be found to have met with the best success.

"The soil of like quality," taking an average of the farms as they are now through the State, will admit of a division into tillage, pasture, and woodland of about one-third to each. The forty acres, about fifteen in field, fifteen in pasture, and ten in wood-lot. The same proportion will give for the two hundred acres seventy-five in field, seventy-five in pasture, and fifty in wood-lot. This division is not made with any intention of raising an objection to a system of rotation, where the soil and circumstances will admit.

It will be readily admitted that the outlay for the dwelling, furniture, carriages for family use, and expenditure for the ornamented surroundings, together with the expense of keeping all in good repair, will be the same in one case as the other. That for other



IMPORTED COTSWOLD RAM, "HIS ROYAL HIGHNESS."

Bred by Robert Garne, Aldsworth, England. Imported by and property of Bardett Loomis, Windsor Locks, Conn. Winner of 1st prize as a two-year-old at Brattleboro', Sept., 1866. Winner of sweepstake medal offered for best Long Woolled Ram of any age, open to United States and Canada, at Brattleboro', Sept., 1866.

buildings will of course vary according to the size of the farm. The additional cost of land will have to be taken into the account.

The objection usually raised against the small farm, and that entitled to much weight, is the want of land. The complaint generally most frequent on the large farm, is a want of labor. If the occupant of the former has a family of boys and girls, they very soon find the limits of the farm too small, and either the children or the father seek employment elsewhere—often at a distance from home and its protecting influences—causing a separation of family ties that may never be united. If the owner of a larger farm has a like family, his want of labor is in a great measure supplied, and the extent of his land will give them useful employment and scope for improvement.

Again, if there are no spare laborers on the small farm, and the owner is obliged to hire, he will not, as a general rule, engage help by the month, but by the day, as his needs require. He will endeavor to perform all the labor his strength will admit of, and it is believed look with much doubt upon the wisdom of leaving a large farm for a small one, with the expectation of a less laborious life. Should the larger farmer be similarly situated he will consider himself able to employ help constantly, and will always aim to have a good strong man to relieve him of the heavier portions of farm work.

The want of land can seldom be supplied to advantage by the small farmer. Whereas the want of labor experienced by the owner of the large farm can usually be met without much difficulty. The first will also be obliged to keep a small team, whether of oxen or horses. The other will be able to keep a team of either oxen or horses, or both, of sufficient strength to do all heavy work, such as "breaking up," &c., without the expense of additional teams, or of exchanging with neighbors, as the practice of many is. The cost of labor-saving machines and implements, together with farming tools to cultivate the forty acres economically and successfully, will amount to nearly as much as for the two hundred acres.

The additional quantity of land will enable the owner to keep a much larger stock on the farm, the annual growth of which will be a source of income. He will be able to rear his young calves and other young stock, and sell them when they have arrived at maturity, and are the most valuable. On the other hand, the small quantity of land renders it necessary to dispose of many of the

calves to the butcher, for want of room to keep them. The ten-acre wood-lot, it is estimated, if well husbanded, will support the fires. A like quantity taken from the fifty-acre lot will leave forty acres, which, in many localities, may be turned to good account. What has already been said in reference to labor, may be applied to the affairs of the household, as well as to outdoor labor, with equal force.

We are aware that the friends of the theory, "Two acres enough," "Ten acres enough," and that small farms have advantages over large ones, will be very likely to disagree with the position taken in this paper. But as yet, no sufficient evidence has appeared to prevent any one who is in possession of two hundred acres or more, keeping only one cow, or going into the business of raising blackberry canes on a corner of his lot, if his locality, circumstances and inclination should happen to lead him in that direction.

It is not the intention of the writer to say anything to dampen the ardor or enthusiasm of the cultivators of small quantities of land. Too much commendation cannot well be bestowed for the courage and industry exhibited by many in rescuing some forbidden portion of the earth's surface, and making it both beautiful and profitable, and many a farmer on forty acres has done more for the improvement and dignity of agriculture than some of those in possession of broader acres. What especially is contended for, is that nearly all the advantages claimed by the friends of a small quantity of land, are also possessed by the owner of the larger quantity, and that his hopes of relief by a change would, in all probability, be disappointed.

Mr. Goodale submitted the following report on Topic No. 9 :

The committee charged with the following topic, viz : "*To consider the practicability and expediency of transferring to the Agricultural College, whenever the same shall go into effective operation, the labors and duties of the Board of Agriculture,*" respectfully report as follows :

The policy of the State, which has become defined and established in the twenty years past, toward that great interest which embraces a very large proportion of the population and wealth of the State, may be fairly characterized as a liberal one. At various times the legislature has created instrumentalities calculated to

foster and encourage it. To societies formed for the same purpose, it annually extends material aid.

To a considerable extent, these organizations accomplish their ends *by the diffusion of knowledge*, and so, in a true, although not in the ordinary acceptance of the term, they may be considered as educational in their nature.

By the premiums offered by agricultural societies emulation is excited, and when the various specimens of crops, of animals, of implements, etc., are brought together, opportunities are furnished for comparison and for the study of facts and of objects which are highly instructive. The labors of the adjudging committees do sometimes, and might much oftener than they do, result in the preparation of a report, which, besides announcing the awards of premiums offered, embraces the data, facts and views upon which the decisions were based, and often much valuable information upon the general subject involved.

Besides these, whenever anything is offered for premium, the nature of which admits of it, as a crop of roots or grains, or a fine animal, the law requires a statement to be made which shall convey to all interested in the subject a knowledge of the methods by which and of the conditions under which such a result was attained, and how it was brought to the degree of perfection exhibited. The publication of such statements may not only result in diffusion of knowledge, but in positive additions to our stock of knowledge.

There is greater need of such aids to progress in agriculture than in other branches of industry, from the fact that those who pursue it, are, by their vocation, for the most part, necessarily confined upon their own acres, and so being isolated from each other, have little opportunity otherwise of learning what improvements are made, and how the most productive results are attained.

The State Board of Agriculture is another instrumentality created by the State. It is a deliberative and advisory body, holding an annual session for discussion and investigation of matters pertaining to the general husbandry and rural economy of the State. Besides which are presented essays, carefully prepared at home before the session, and also reports of experiments which have been instituted and carried on in order to ascertain the conditions of successful cultivation. Among the duties of the Secretary of the Board, we may allude to the requirement that he become acquainted with the agricultural capacities of the State, its soil,

its crops, its means of fertilization, its methods of husbandry; and to suggest improvements, to learn what progress is making in agriculture in other States and countries, to correspond and invite exchange of documents with kindred associations elsewhere, and to prepare an annual report embracing the doings of the Board, the results of his investigations, with such recommendations or suggestions as the interests of agriculture seem to require. This report is published and circulated among the farmers of the State.

It may be said, therefore, that the aim of the Board is, even more exclusively than of agricultural societies, the acquisition and diffusion of knowledge. The success which has attended the employment of these instrumentalities is marked and highly gratifying. Perhaps the most tangible and definite indications of this success are furnished by a comparison of the United States census returns for 1850 and 1860. Although these were alluded to in a report made to the Board some time ago, it may be well here to refer again to some of the facts thus elicited. By such a comparison we find that, be the causes what they may, we did not retain our natural increase in numbers, the increase of population in that decade being only six and one-half per cent., but notwithstanding this the number of acres in farms increased from 2,039,596 to 2,677,136, or about thirty per cent. We find the value of farms to have increased from \$54,861,748 to \$78,688,525, or equal to forty-three per cent. Be it remembered that none of this can be ascribed to advanced prices due to a depreciated currency. It was a time of peace and of equable values, all alike based upon a currency as good as gold. The improvement in stock was even greater—while in numbers the animals increased less than seven per cent., (or just about the same as the population,) the value advanced from \$9,705,726 in 1850, to \$15,437,380 in 1860, being no less than fifty-nine per cent., and the value of slaughtered animals showed an advance of sixty-eight per cent. This is a record of which any people may be proud; and while it is not claimed that all this increase was due to the labors of agricultural societies or of the Board, yet it may be fairly claimed that the various improvements by means of which this result was brought about, were, all of them, *initiated* and steadily fostered by them, and that thousands of farmers who had no direct connection with them were excited to emulation, stimulated to improvement, and induced to adopt improved methods when they had seen these prove successful with others.

The years which have passed since the last census was taken, have been eventful ones. The energies of farmers have been taxed to the utmost. Is it unwarrantable, in view of the above facts, to assume that the progress made, the improvements effected, and the knowledge gained during the previous years, were largely instrumental in enabling the accomplishment of what has since been done by the lessened numbers engaged in agriculture? We think not—nor do we believe that any candid mind will fail to be convinced that the fostering aid extended by the State to this, its greatest material interest, has been repaid many fold in the increased wealth and power of the State, and its present ability to bear the unusual burdens which have fallen to our lot.

We are not aware of any desire to see these instrumentalities done away, or seriously modified, but we are approaching a new era in the history of agriculture in Maine, and it may be well to cast a glance, as far as we can, into the future. Before long, we hope to see a new instrumentality at work, which, we trust, in due time, will accomplish greater results than have yet been attained. The Congressional grant in aid of a college for the liberal and practical education of the *industrial classes*, has been accepted by the State. An act to establish such a college and defining its characteristic features has been passed. We trust the time is not far distant when it will go into operation. Its means are small, much smaller than may be needed to secure able teachers and other requisites to give it due effectiveness. As yet, the State has bestowed upon it no endowment or stipend—whether it may is uncertain.

The object of this institution is to train up generations of youth better drilled than their fathers have been in the practice of farming, and more conversant with those laws of nature which must ever underlie practice. The farm upon which the college is located is to be the theatre of careful investigations. It is expressly provided for by the act of Congress, that an annual report shall issue therefrom regarding the progress of the college, recording the results of the experiments and investigations made, and such other matters, including statistics, as may be deemed useful. Having clearly in view the above named facts and prospects, we are better prepared to approach the questions embraced in our topic—Is it practicable and is it expedient to transfer to the Agricultural College the labors and duties of this Board? or, more properly, *will it* be practicable and expedient? These are ques-

tions of such importance as to demand serious and careful thought and investigation. We are not prepared to do more at this time than to invite attention to this subject. As members of a Board representing the agricultural interests of the State, our desire is simply that the greatest good to the cause be effected with the least expenditure. We have no desire for place other than as it may afford means of greater usefulness. There is no occasion for hasty action now, and if its consideration be entered upon in season, there can be no excuse for hasty action hereafter.

As the result of such thought as we have been able to bestow on the subject, we may remark that there does seem to be a possibility that by adding to the means of the college an amount equal to the expense attending the operations of the Board, more might be accomplished by some persons connected with the college whose acquirements and training have specially fitted them for the work, and whose time is given to such labors continuously through the year, and year after year, than can be expected of members of the Board as it is now constituted.

It seems not unlikely also, (if means admitted it) that the report to be issued from the college might be made such as worthily to supersede the report now annually issued from the Board, that it might be circulated to an equal extent and with as good result among the farmers of the State; and that, generally, the concentration of means and efforts might accomplish more valuable results than can be expected by laboring separately. While we would deem it palpably unwise to decide these questions in advance of the further development of the college, and the selection of the persons to be charged with its more active operations, we commend the consideration of the topic to all who feel interested in the advancement of agriculture among us.

Mr. Wasson presented the following report on Topic No. 8:

Is it expedient for the Board, while regarding the fearfully increasing pests to vegetation, to recommend the appointment of a State Entomologist?

Mr. President: I propose to discuss this topic in general terms, rather than to that specific point indicated in the text.

"Have an eye upon your fences," was for many a year the initial motto of the Old Farmer's Almanac, until repeated so often it came to be regarded as an indispensable condition of success,

to build efficient barriers against whatever it was desired to shut in or to exclude.

Time was, when with the greatest investment of capital in this country in common fences, (and the same is true to-day,) when to be environed by a lawful fence, was a guarantee against mischievous or destructive animals. But under this *insect* dispensation, this huge amount of capital is, to all intents and purposes, dead, as a protection. For o'erleaping ditch and dike, scaling fence and wall, inexorable as death at the appointed time, they come. Monarchs of all they survey, the whole vegetable world pays tribute to satiate their voracious demands. Nothing escapes, nothing is invulnerable. Their capacity to devastate, to "lay waste," is incredible.

As foragers they excel. Millions of dollars worth of vegetation are annually destroyed, and too often has the cause been attributed to some fancied freak of nature, as if her laws were dictated by coquettish whims.

For years the midge in wheat was supposed to be a mildew or blight. A peculiar shrivelling of rye, supposed to be caused by some unfavorable condition of soil or climate, has recently been found to be the work of a minute insect. And who is prepared to say how much some insect has contributed towards the cause of the potato-rot.

For a number of years before insects were supposed to seriously injure the cultivated crops, the caterpillars were known to be making sad havoc with the forest trees in Europe. In 1837, Switzerland paid \$1000 for the destruction of these pests, to save the forests. From 1790 to 1800, the caterpillars destroyed \$300,000 worth of vineyards on the borders of the Rhine.

Within the past ten years the Swiss government has paid for ten millions of butterflies.

But with the work of devastation going on *here*, a diverting of our attention *there* savors strongly of "misery seeking company."

It is estimated that in Illinois the midge destroyed in a single year \$20,000,000 worth of wheat, and in New York \$15,000,000 worth. With the advent of the midge as a co-worker with the Hessian fly in 1834, the culture of wheat was almost temporarily abandoned in Maine, excepting in favored localities. In Monroe county, N. Y., which in 1845 raised more wheat than all New England, the midge proved so destructive, that for several years

the propriety of abandoning the wheat crop was seriously discussed.

It is estimated that 15 per cent. or \$75,000 worth of apples are destroyed annually by the caterpillars alone, in the State of Maine. Who can estimate the real or prospective loss of apple trees caused by the borer, or the value of fruit punctured and destroyed by the curculio?

While the number of plant-feeding insects, says Harris, "is not legion but legions in our country," there being some 25,000 distinct species, every year is adding by importation to natural increase, to spread over the country, causing losses too great for calculation.

Every year, with the return of vegetation, come again myriads of insects, old acquaintances and new, to prey upon the farmer's toil.

It has been recently stated that in the western basin of the Mississippi, an insect fatally destructive to the potato has appeared, which is travelling eastward at the rate of 50 miles a year. This insect, called the Ten-Lined Potatoe Beetle, was first discovered on the Upper Missouri.

In June, of 1864, in Nebraska, an insect, hitherto unknown in the world, was discovered, called the "Bee-Killer"

During the season of 1865, an unnamed and unknown insect was discovered preying upon the Canada thistle. If they will only stick to the thistle, we will quote so much of Shakspeare to them as to say "your graces are right welcome."

We may well query, from whence these new insects? Are they of spontaneous origin? Is the work of creation still incomplete? Has the "letting down of a great sheet from heaven"—as in Peter's time—"with all manner of creeping things," been repeated?

The capacity of insects to increase, to propagate their kind, is incomprehensible. Some species of the caterpillar will lay from 150 to 600 eggs twice in a summer. Some insects, as the pine spider, will lay 800 twice and often three times in a season. Indeed, many of them, like the hens in Holland, are "everlasting" layers. The fecundity of plant-lice is marvellous. It is said that one aphid may become, in a single season, the progenitor of over five thousand millions of descendants. With such enormous powers of multiplication, we might reasonably apprehend the speedy destruction of all our crops. But the increase is governed by

natural causes, and by natural causes held in check. The balance of causes has only been removed, giving the insects much the longest end of the lever.

This condition of affairs can and must be reformed.

The importance of a knowledge of insects must be obvious to every one who reflects upon the devastations committed by them. The problem of course is, how to destroy this legion of enemies. To do this with the greatest effect, we must watch them through all their changes.

But however desirable a knowledge of entomology may be, but few have the time to acquire it. The farmers at large must glean what information they can, and guard their crops as best they may—but I submit if its importance does not demand the establishment in every State of some *central Head* with whom this science shall be a speciality. Some point from which shall radiate instruction, information and protection.

We have accustomed ourselves to suffer the depredations of insects as a "train of abuses" from which there was neither escape or appeal. New guards for our future security are now demanded. Without them, however much our operations are governed by the most approved rules of agricultural jurisprudence, success, the end desired, is not attained. New guards against a new enemy must be invented, or old guards revived against an old enemy multiplied to excess.

As a first step towards its accomplishment, I submit the following resolution :

Resolved, That the Board of Agriculture recommend the appointment of a State Entomologist.

Mr. Bigelow submitted the following report on Topic No. 10 :

Can effective measures be adopted to increase our crops of hay without the use of barn manures or concentrated fertilizers?

In treating this topic, we are aware of the difficulties under which we labor, in instituting methods of cultivation upon such portions of our worn out meadow lands, as will produce the desired result without the use of manures or fertilizers, yet we propose to offer a few hints ; and first, plowing and seeding with clover, and turning under when the clover is ripe enough for the seed to grow, and repeating this until the soil becomes enriched with vegetable matter, would be a safe and profitable method to prepare the soil for a future crop of hay ; at least we are told that

it has been extensively practised by agriculturists in New England and the Middle States with satisfactory results, and we have no reason to doubt the fact.

Our second method would be to plow in the month of June and sow buckwheat, Indian corn, or other seed for a grain crop, and turn this under in August, and then seed with timothy and clover by way of preparing the ground for a crop of hay the next season.

Summer fallowing, we can have no doubt, would be a profitable method to pursue to bring our exhausted meadow lands to the production of larger crops of hay.

The harrow may be used in August on non-producing meadow lands with good results. It would loosen the soil among the roots of grasses, and by sowing grass seed (not sparingly) would make a profitable return for all needful expenditures.

The mower and scythe may both be used so as greatly to injure the succeeding crop of hay, by cutting the grass too close. Great care should be taken not to cut less than two or three inches from the root; cutting clover and timothy below the lower joint, lets in the water and destroys the plant.

The practice of feeding meadow lands, after the crop of hay is taken off, or before, is one which we believe injurious and largely lessens the crop. Cannot some general method be adopted to avoid the necessity of pasturing our meadow lands, by instituting some green crop on which to feed and be a future benefit to the agriculturists of Maine?

Rotation, or changing from meadow to pasture and from pasture to meadow, would, oftener than generally practised, naturally have a tendency to increase the crop of hay.

Drainage, whenever required, is a most effectual method of securing larger and more uniform crops, and hay of better quality also.

The hay crop, being the largest and most important of all in this State, as well as the basis of all our farm operations, should receive the greatest care and thought, and no means neglected to insure its success.

Mr. Jefferds presented the following report on Topic No. 11:

Should the use of horses be encouraged to the exclusion of oxen, for farm labor?

That horses have taken the place of oxen to advantage, in many branches of business requiring animal labor, is evident to all. We

no longer see teams of oxen wending their way twenty or thirty miles, with spars, keels, shingles or other lumber. Railroads in some sections, and horses in others, have taken their place. The slow gait of the ox, and his increased value other than for labor, have made the horse more profitable for these purposes: so, in the lumber region, the timber being exhausted on the banks of the streams and near the lakes, the long roads now used require an animal of quicker pace, and the price of beef makes it expensive to leave the "tallow on the landing," and bring the team out with only the "hide and horns," which was the motto in the days when lumber was king, and the pine tree thought by many to be our only resource. Oxen are now used to some extent for lumbering, and it is maintained by some, that they are more profitable when properly used, even on long roads. We often see teams that have made a good winter's work, come out in the spring, fat and sleek, so that after a few weeks feeding they are in condition to grace the stall of some city market.

Horses have also taken the place of oxen to some extent in farm labor, and we think in some instances to the farmer's disadvantage. While the horse has more attractions, in his lively actions and excitable temperament, we think the prosy ox more economical, and better suited to much of our farm labor; and to give a reason for the faith within us, we will enumerate some of his advantages. It is less labor to harness the ox, and the cost and wear and tear of harness and implements are much less than with the horse. He has the advantage of being put to labor at an earlier age, enabling the farmer to obtain both labor and growth at the same time. With the horse, we have to wait until he has nearly attained his growth, and then he is not a pleasant and safe animal until he has accomplished one or more years work, so that, when he is fit for farm work, he has attained his full value. Oxen can be turned into cash at their full market value at almost any time, while the horse, being valuable for that one purpose, has to wait for a market. The liability of the horse to accidents which diminish his value, or render him worthless, is a large item against him compared with the ox. The season requiring constant animal labor is short, and while the ox is paying for his food in flesh and growth, the horse is an expense.

We know many farmers, who keep but one yoke of oxen to do their farm labor, who realize from fifty to one hundred dollars from the growth and flesh of their oxen yearly, and this almost wholly

on hay and grass. We think we are warranted in the assertion that, as a general thing, take the country through, the farmers that keep good fat sleek oxen, are more successful than those who keep horses to the exclusion of oxen; not but that some good farmers use horses exclusively, (and no doubt under some circumstances they are best); still, as a general rule, we think the horse should not yet take the place of oxen for farm labor; that instead of selling our steers, at one, two, or three years old, to go out of the State, they should be worked on the farm until matured, and fitted for beef.

On the evening of January 29th, in the Representatives' Hall, Mr. French pronounced the following

EULOGY ON THE LIFE AND CHARACTER OF DR. EZEKIEL HOLMES.

Great men live two lives;—the one material and simple in the midst of our common humanity, the other memorial and sacred in the just appreciation of future generations. The world is slow to recognize its great benefactors, and has no standard to measure their influence till after they have passed the pale of mortal existence. While among us they live and move as do their fellow men; the soul-aspirations, the heart-impulses that are the secret springs of action in their lives, are not felt by the busy multitudes that throng the ways of the world, and when at length they pass to that exalted state whence their aspirations came, and where the generous impulses that so often moved them to godlike acts here meet fraternal greetings from kindred spirits, men wonder at the void they have left, and recall their many virtues as they would gather up lost treasures.

Those whose names are most illustrious as philanthropists and well-wishers of mankind, have lived in spirit far in advance of their time, anticipating the world's millennial state by hundreds of years. They have been to us glimpses of a nobler man, of a purer life, of a more exalted being, such as the good hope to attain to and the promise is the world shall see. They have chafed sorely at the wickedness around them, and sometimes have drawn darker pictures of life and human depravity than the most unfavorable construction given to passing events would warrant. Others no less exalted in spirit, but always recognizing the great facts inseparably connected with man's earthly existence, have always labored for the greatest good of the great whole, and have never failed to make their lives sublime. The foot-prints such men leave behind

them are as distinct as bird tracks in the "old red sandstone," and the record they bear as reliable as the eternal testimony of the rocks.

The masses judge of men and things from external circumstances. To them earth is earth though diamonds lie embedded in its mould, and shining sands attract the simple and unlearned more than the fine gold they see not.

There are men whom some great wave of popular favor brings into notice, and for a time they are able to sustain themselves before the public, but if there are no sterling qualities of head or heart, they soon sink to a level with the common strata of mankind, and are soon lost sight of among the crowds that go down to oblivion.

Humanity in the end is true to itself, and sooner or later acknowledges the power and might of individual influence. Greatness wears no trappings—needs none. The conception of great thought is its insignia, and the execution of mighty deeds gives the world's commission to command. *All* do not wear both alike; *all* do not bear the palm; even as *great* gods were few when divinities dwelt with men and hero-worship was supreme.

Such are some of our reflections when we contemplate the life and character of the late Ezekiel Holmes. A man whose like had not been before him among the ancient men of our State; the like of whom we shall look for in vain in the present generation. Born at Kingston, Old Colony, August 24, 1801, he graduated from Brown University in 1821, and received the degree of Doctor of Medicine from Bowdoin College in 1824. From this time forth he became a resident of this State, practising his profession, Principal of the Gardiner Lyceum, Professor of Natural Science in Waterville College, Editor of the *Maine Farmer* for more than thirty years, a member of the Legislature for five consecutive years, conducting scientific surveys on behalf of the State, first Secretary of the Board of Agriculture and of the State Agricultural Society, Vice President of the National and the New England Agricultural Societies, and member of various historical and scientific societies, several of which positions he filled at the time of his death, and in all the posts of honor to which he was elevated discharging his duties with a faithfulness and ability that strengthened the estimation in which he was held by the public.

The character of his mind was suggestive rather than practical. While laying down premises and drawing conclusions that others

would seize upon and work out successfully, he rarely availed himself in practice of the benefits thus arising from his own labors. His power of generalization was greater than is possessed by many men, even of his attainments. He comprehended at a glance, and was quick to perceive the relations the parts bore to each other. The minutest details were entered into and understood as well as the more generous principles, and he was thus able to comprehend fully whatever came under his observation. He saw things for himself; he saw things as others looked upon them, and having this distinctness of conception combined with a clearness of expression that left no point in doubt, he was both the instructor of the humblest and the wisest. Herein was the secret of the power he exercised over those who came within the sphere of his influence, whether he discoursed to them in the popular assembly, or from the editorial chair.

He thirsted for knowledge continually; not the knowledge of books, but the knowledge of nature. He had no desire to revel in classic lore, no taste for the subtleties of mathematical calculation, but when he opened the book of nature, his whole soul was absorbed in its mysteries, and he delved among its treasures as the miner working on golden sands dreams of boundless wealth. He let the dead past sleep with the slumbering ages of by-gone centuries, waiting its own resurrection, he lived with the living present, anticipating the future, sufficiently to stay no march of progress already indicated by the shadow of coming events. With him right was right, no matter who opposed, and his fearless soul dared to defend it. His own consciousness of duty performed was more to him than the consciousness of the world's applause. The cause of humanity, the rights of the oppressed, the defence of government, and loyalty to country in darkest hours, found in him a ready defender, and the patriotic utterances of his heart were akin to the devotion of the fathers.

He was the true conservator of the industrial and domestic interests of Maine, and watched their progress and development with all the solicitude and care of one whose vital concerns were at stake. To the farmers whom he so often met in the midst of his labors, he was emphatically a father, and in the many homes in his own and other States lived a numerous family. When he went forth he moved as a patriarch of old among his children, their herds and their flocks; all were ready to bid him welcome, and thousands rose up to do him reverence.

From a neighboring province comes a most fitting and appropriate recognition of his services in the great cause to which his life was devoted, in a valuable contribution to the monument the people are voluntarily dedicating to his memory.

His sympathies were emphatically with the masses. Man was his brother, and in whatever state or condition he met him he was ever ready to extend the right hand of fellowship to his equals and comrades in life, or relieve the wants of the mendicant that sought his charity. He was thought sometimes to be open to censure in this respect, so forgetful would he be of the duties and obligations he owed to himself and family, that the needy should not go away empty from his door; but it was all of the generous promptings of his own heart, and the world forgives it in him now he is gone.

He lived not to himself, nor for himself. While he lived in the present, he lived to the future also; two lives blended in one, that the harmony of that life might be the more complete. With him the question was never considered whether he was to gain or lose by the transaction, but would it be productive of individual or public good? And having settled this point in his own mind, he entered into the execution of it with all the zest of a disciple of mammon, and the enthusiasm of a votary of pleasure.

He was a remarkably public-spirited man; he was made for the public, not for himself; had no interest, seemingly, in himself. His own identity was lost in that of others, to the entire exclusion of personal preferences, if he had any. His idea seemed to be, judging from the tenor of his life, that humanity had a common right in the bestowals of Providence, and whether they chose to avail themselves of that right or not, it mattered not to him, he admitted the principle. That he had faults, men that knew him will not deny; all fail in some particular in the rule of life, and his was no exception. Great men are great in all things pertaining to themselves. If they excel in great virtues, they may likewise sink into great vices; in proportion as they excel the world's average ability in what makes them great, they may fail of doing in what makes men successful. To this latter class of great men, Dr. Holmes undoubtedly belonged. Acknowledged as a great teacher of men in things pertaining to the visible universe, yet he was not their exemplar, but had need

rather that he be taught *of men* in what were the first principles of practical life.

In his intercourse with the world he was affable, courteous, always approachable. Men came to him without restraint, and though sensible of the presence of superior intelligence, yet enjoyed a freedom of communication allowed among the commonest. He drew men to him rather than repelled them, and thus was able through a long and useful life to retain his hold on the popular heart. Honest in his convictions, he always defended the positions he assumed with a pertinacity of purpose and a vigor of intellect that made him no mean antagonist in polemic contests, and soon assured his rival that "there would be blows to take as well as blows to give." His tastes were simple, his wants were few and easily supplied, his morals were correct, his testimony believed, and his whole life in harmony with himself if not with the world; and when the great destroyer came he was stricken down, but did not fall; he rose to a higher plane of existence, to that memorial state in which men cease to admire but to revere; and the legacy he left behind became the common heritage of all.

When the act of Congress bestowing grants of land to the several States for the endowment of agricultural colleges passed, he entered into the consideration of measures whereby the State might avail itself of the benefits of the appropriation, with all the strength and ability his life had given him, centred on this one enterprise all his energies, deeming that he saw in it the consummation of his desire in the present, and the realization of his hopes for the future. He guarded every avenue of approach to its funds with the jealous care, the eagle eye of a sentinel on some lofty watch-tower, and wo to the falcon claws that presumed to clutch at the prize. The last and most distinct impression we have of Dr. Holmes is on the occasion of one of those contests for the bestowal of the gift the State has witnessed since accepting the favor, and will be recalled by many present as the first hearing before the Committee of Agriculture on the proposition from Bowdoin College, contained in the report of the Commissioners. The case had been stated, the claim set up, its advantages fully set forth, and it came the Doctor's time to reply. He arose to speak with eyebrows knit, with lips contracted, and in an analysis of the whole subject, clear and distinct as his own thought, he pointed out what he deemed would be the gross injustice done to the industrial classes if the national gift was diverted from its original

purpose by connecting with any existing college, and warming with his subject, his countenance all aglow with the fire of his soul, his eye lit up with a view of the present and visions of the vast multitudes reaching far into the future, whose champion he now was, he drew himself up to his fullest height, his whole frame thrilled through with emotion, and throwing back his head with the right arm extended, pointing to the committee, exclaimed: "and now I tell you, Mr. Chairman, that the farmers of Maine, after having desired this thing so long, and hoped for it so long, and prayed for it so long, and *waited* for it so long, are not now going to sell their birthright for a mess of pottage."

I see him now as I saw him then, one year ago to-night, standing in this hall, and the scene will ever remain a vivid picture while time and reason last. The occasion was historic and worthy the pencil of a painter, and could it be delineated with the hand of a master, would be a most fitting memorial of the closing labors of his life. The next week he was again before the committee, earnestly contending for the people's right to the independent location of the college, where he contracted a severe cold; an attack of acute pneumonia came on, and on the 9th of February his days ended in the midst of their activities. He went from the committee room to his hotel—to his home, from his home to the grave—to the grand empyrean on which his pure thoughts often dwelt, and where in his faith he expected to meet the friends who had gone before him, and there wait to be joined again to those who should follow.

Thus lived and died one of the most useful citizens, though an adopted one, the State ever had; one whose memory will long be cherished by all who knew him, and time shall hallow it in the hearts of the people. Peace be to his ashes, he rests in peace. His name and his fame belong not to us alone; they have gone forth to the world, and his eminent abilities and distinguished services have been appropriately recognized by his compeers in scientific labors and research. One who knew him intimately and well, paid this most fitting tribute to his worth while living, in this brief comparison:—"Massachusetts boasts the wit, prose, poetry and patriotism of her Dr. Holmes; the Dr. Holmes of Maine will be remembered in his works, when prose and poetry are forgotten." He needs no stately mausoleum with lofty dome, beneath which his dust shall moulder, or colossal bronze in giant

form to perpetuate his memory ; a grander symbol is his, a nobler arch is reared.

Citizens of Maine ! Would you behold his monument ? Look around you ; the unfinished temple of knowledge rises grandly before you ; the nations stand on its broad platforms, all tribes and kindreds and tongues mingle in its consecrated halls. Build it as he builded, till its pillared dome shall pierce the clouds, and everlasting sunlight plays around its summit ; and when the teeming millions of generations yet to be shall crowd its courts to worship at its shrine, they shall see written on a fair stone, conspicuous among earth's honored and illustrious sires, whose fame covers its walls within and without, from foundation course to topmost stone, the name of Ezekiel Holmes."

Informal meetings were held at various times during the session, at which numerous topics were taken up. In these discussions members of the legislature freely participated, and much interest was awakened. With few exceptions, the notes of those now at my command are insufficient to do justice to the speakers, and they are accordingly omitted.

During an evening thus devoted to the subject of orcharding, some facts were presented, worth preserving. The discussion was opened by Mr. Perley, late President of the Board, who remarked that orcharding was profitable in this State. In the hilly part of Maine apple-trees can be grown successfully, and an acre in orcharding will produce as much or more than any other crop. He gave the following statement of the profits of four acres of land in orcharding for the years 1864 and 1865, which was pastured with sheep :

1864.	ACCOUNT OF FIELD No. 9.	Cr.
By 350 bushels hand-picked apples, \$1.25,		\$437 50
By 115 bushels windfall apples, 50c.,		57 50
Pasturage,		10 00
		———— \$505 00
	Dr.	
To labor draining,		\$11 25
To labor grafting and pruning,		12 25
To harvesting,		49 25
To interest and tax on \$500,		40 00
		———— \$112 75
Net income, \$392 25.		

1865. ACCOUNT OF FIELD No. 9.

By 450 bushels hand-picked apples, \$1.75,	\$787 50
By 80 bushels windfall apples, 75c.,	60 00
Pasturage,	10 00
	————— \$857 50
To labor draining,	\$34 00
To labor harvesting and pruning,	33 50
To interest and tax on \$500,	40 00
	————— \$107 50
Net income, \$750 00.	

We can get nursery trees that can be brought to bearing in eight or ten years ; but to do this the orchard must be tended and cultivated as much as corn—especially when young.

The Baldwin apple—a valuable sort—is a little tender, especially when on low lands, but on high land it succeeds well. This fact has been proved in several localities and instances. An apple that shall take the place of the Baldwin in other qualities and be hardy, is much needed, but has not been found. The Baldwin is an excellent apple for transportation, as it does not bruise easily.

The apples in this State are more solid than those grown in New Jersey, and bear shipping and transportation better. This is an advantage States in a southern latitude do not possess. Many apples are shipped annually from Portland to the West Indies. This year apples from Nova Scotia have been brought into this State in considerable quantities.

He believed the soil along the seaboard was not adapted to apple trees ; they did not succeed as in the interior of the State. Considered the Baldwin the best apple for profit—next the Rhode Island Greening. The latter has a reputation, and will always sell. Thought Maine as well adapted to pears as Massachusetts. Can give no satisfactory reason for causes of failure of the past two years. Cannot believe that the prevailing cold east winds in spring cause the failure of the fruit crop, for we have such winds every year, and fruit is made to grow in just such winds. Alluding to the severe seasons of 1856 and '57, he said that in February we had weather such as is usual in April or May ; the trees started into growth, and the severe cold following killed the newly formed alburnum, and in spring the starting of the trees peeled off the bark and the trees were killed. These severe seasons had not damped his courage in the culture of fruit trees, for the same might not happen again for one hundred years.

Rev. Mr. Dike, of Bath, remarked that he resided on the sea shore. In his vicinity fruit culture is diminishing. He had, in his orchard of old trees, tried various modes of culture. The subsoil is a stiff clay, and he had underdrained with a view of improving the character of the orchard. The drains were run close by rows of trees, and with most satisfactory results. He believed we could raise pears successfully in Maine, and had found on the stiff soil in his locality underdraining necessary to success. The same was true in regard to cherries.

As a good eating apple, he would put many kinds before the Baldwin, although he agreed with the remark of Mr. Perley as to its market qualities.

Mr. Prince made some remarks, giving an account of his experience in orcharding, and believed that it can be made the most remunerative branch of farming in Maine, but it must be attended to, and great care must be exercised over the trees to keep them healthy and guard them from the borer, &c. Had succeeded well with the Bartlett pear, which had proved sufficiently hardy. Thought it would be a good plan for agricultural societies to encourage the planting of nurseries. In regard to planting trees, preferred to set in fall instead of spring. Sets his apple trees thirty feet apart.

Mr. Hills, of Northport, stated that in setting out a new orchard, he first drained his land, and the trees nearest the drains are the healthiest and bear the best of any in the orchard. Cultivates pears as easily as apples, and the trees are healthier. Soil loamy, with stiff clay subsoil. Has been very little troubled with the borer. Grows several varieties of pears. The Madaline succeeds well, and grows and bears well. In his locality trees with the same care will do as well as in any part of the State. Uses rockweed for a mulch with excellent results. Trees thus mulched were not infested with caterpillars as were those not having the rockweed about them. It is also a preventive against the borer. Thought the Flemish Beauty one of the best pears grown, and had sold his for \$5 per bushel the past summer.

Mr. Bigelow remarked that in his section of Somerset county the apple trees were as bare in June last as they are in December, on account of the ravages of the caterpillars. Acres and acres of forest growth were also completely stripped of their foliage. If some sure remedy for this pest could be found out, it would be of untold benefit to the State.

Mr. French stated that he had a tree bearing apples called the "Grindstone," (which originated in South Hadley, Mass.,) growing by the side of a Golden Russet tree. The branches of the former extended into the Russet, and on one twig of the Russet were three apples, two of which were Russets, the other being to all appearance a "Grindstone." Specimens of these apples were exhibited, and gave evidence of a curious freak of nature in the production of fruit.

Another evening was devoted to the question, "What is the preferable season of the year for preparing land and manuring for hoed crops?"

Several gentlemen were heard with interest in detailing facts of their experience, going to show that autumn presented greater advantages for this purpose than the farmers of Maine had been accustomed to avail themselves of. Phineas Barnes, Esq., of Portland, spoke at considerable length. The views presented by him were the same as he urged upon the farmers of Cumberland in an unwritten address, at their exhibition the year previous. Kindly acceding to the request of the Board, he has consented to write out his remarks, and they may be looked for in subsequent pages of this volume—and are commended to careful perusal.

The final adjournment of the session was on January 30th.

ON THE CULTIVATION OF THE HOP.

As a general rule, the gains of agriculture are moderate and sure; but the rule is not without exceptions. The Hop is generally reputed to be one of the most uncertain of agricultural crops, in respect to the pecuniary returns which it yields. This uncertainty has been due mainly to two causes—first, the enemies which the plant has to encounter, and which reduce the yield; and secondly, to the excessive fluctuation in prices. The latter has been largely occasioned by the fact that no means have yet been successfully adopted on the large scale to retain the crop of abundant seasons for use in subsequent years of scarcity without serious loss of quality, and consequently of market value. There seems to be reason to believe that the difficulty may be overcome, as I shall presently have occasion to show, and that in future fluctuations in price may be less than heretofore.

The result of personal inquiry among the growers in Maine, has led to the belief that the crops during twenty to thirty years past have been much more uniform in this State than they have been reported to be in other sections; no serious hindrance to successful culture having been encountered except the aphid, or louse, which has been troublesome for a few years past. A very intelligent and skilful cultivator of hops for more than twenty years, Mr. Noah Jones of China, and who has made the hop the specialty of his farming operations, informed me that during his experience there had been but one season when it proved a failure, and that, as a whole, the culture was exceedingly satisfactory, the best paying branch of farming which he knew of.

The hop has never been grown very extensively in Maine, yet sufficiently, it would seem, to give tolerable data from which to judge of its adaptation to the climate and other conditions which prevail here, and of the success of the crop so far as it depends on these conditions.

According to the census returns of 1850, the amount grown in Maine was then 40,120 lbs., of which 31,417 lbs. were grown in Oxford county. In 1860 the crop is stated to be 102,987 lbs., of which 85,000 were grown in Oxford county, and 11,000 in

Franklin county. The total amount grown in the United States is reported to be 3,497,029 lbs. in 1850, and in 1860 10,991,996 lbs., of which New York produced 9,671,931 lbs., Vermont ranking next, 638,677, Wisconsin 135,587, New Hampshire 130,428, and Massachusetts 111,301 lbs.,—five States only raising more than Maine. The increase of production since 1860 is believed to be even more rapid than in any previous period, and the demand has more than kept pace with the production, the price being greatly enhanced, and appearing likely to continue at a high figure.

The German element in the population of the United States is a large and increasing one, and many of foreign birth deem their beer as needful as their bread, and not a few born among us tend to the same way of thinking. With the present and prospective demand for malt liquors, the probability of a corresponding demand for hops at highly remunerative prices seems very strong. Whether this large consumption of ale and beer consists with benefit to the individual consumers and to the public at large is not a point here in question. We are now simply considering its mercantile aspect, a question of demand and supply of an agricultural product. Those who conscientiously prefer to discourage the consumption of malt liquors will let beer drinking and hop growing alone. And the latter may also be let alone by those who are content with moderate and surer compensation for their labor in all seasons. Should the aphids and other hindrances become as serious here as they are reported elsewhere, the culture of the hop will be attended with some hazard, and, on the whole, it is rather to those who, living by husbandry and possessing natural advantages for its prosecution, are impatient of the slow gains of its more common branches, and envious of the occasional success of speculators, are willing to put something at risk for large possible gains, that hop culture is specially commended. The risk assumed is much in the nature of an insurance upon the weather, and more against the depredations of enemies; and it may result in a return of somewhere, and almost anywhere, between fifty cents and five dollars per day for the labor expended; or from fifty to five hundred dollars per acre for the crop, and perhaps between even less and more.*

* Mr. M. A. Mason, of Bethel, showed me an acre in its first year of bearing, which was then being picked, (near the end of August,) from which he confidently expected to obtain, at least, a ton of choice quality, worth at present rates something over a thousand dollars.

The successful prosecution of hop culture is not to be expected without the investment of a considerably larger amount of capital per acre than Maine farmers are generally accustomed to employ, and the needful outlay for hop house, kiln, press, &c., renders it expedient that the area under cultivation should be of corresponding extent. Less than three or four acres would rarely pay well enough, and if more than double that surface were cultivated, there might be difficulty, in many of our towns, to secure the necessary labor in picking, curing, &c. On the whole, we would not recommend any to begin with more than three or four acres at the outset, to be enlarged as results may warrant; nor without capital enough to carry it on easily and well, and also to bear the loss of one crop without serious embarrassment.

To an inconsiderable extent the hop is used medicinally, but the plant would not be grown as a field crop except for the properties it possesses as an important agent in the brewing of ale, beer or porter, which it tends to preserve, and to which it imparts a peculiar flavor. When first largely used for this purpose in Great Britain, a strong prejudice was raised against it, and Parliament was petitioned to enact laws against its employment, because, as was alleged, it was "a wicked weed that would spoil the taste of the drink and endanger the people."

The parts of the hop which enter into the composition of the beer are the seeds and the lupulin, or the yellow glutinous matter which attaches near the seed. The latter is the most important and active portion, possessing an intensely bitter taste, and a peculiar, agreeable aromatic odor.

It is because its aroma is so volatile that it is necessary to pack closely as soon as the hops are dried; and with the utmost care the aroma nearly all escapes by the time another crop is grown, so that the value of hops a year old is trifling compared with new ones, which last are indispensable for the finer qualities of malt liquors. Numerous attempts have been made to prepare a concentrated extract from fresh hops, which could be kept long without deterioration, so that the product of plentiful years could be made available in seasons when the crop was small, but such attempts were generally entire failures.

A few years ago, Prof. S. R. Percy, of New York, experimented upon the subject, and I have by me now a specimen of a lot which I saw him make from the crop of 1863, which has been kept now for more than two years in my office with no apparent injury or

deterioration of flavor. Should this or any similar attempt prove successful, as now seems very probable, it would go far towards preventing the excessive fluctuations in prices which have hitherto prevailed.*

The *humulus lupulus* or common hop, is a coarse, twining plant, with rough, angular and hollow stems; the leaves rough, heart-shaped, lobed and serrated. The male and female flowers are distinct and grow on separate plants. The male flowers grow in loose branching panicles, the female flowers are close together in scaly cones, or, in what are called grape hops, in clusters. When grown from seed, a large proportion of the plants are males. This, however, is only done to procure new varieties, and a very small proportion of such would probably be worth cultivation, as they vary as much from the parents as apples, and the seedlings are mostly quite inferior. Male plants are useful to impregnate the flowers and secure greater fertility, but for this purpose one in twenty or even fifty is quite sufficient.

SOIL.—Hops naturally prefer a rich, strong loam. As a general rule, such soil as Indian corn succeeds well upon will grow good hops, though probably one rather stiffer would yield a larger quantity. The extent to which hops exhaust the soil is a disputed point. Most foreign writers call it a highly exhausting crop, as perhaps may be indicated by the name *lupulus*, signifying a little wolf. Growers in the United States generally do not so consider it. Mr. Colman, in one of his reports on the agriculture of Massachusetts, after an examination of the subject and consultation with many growers, says, "the crop exhausts the soil less than almost any crop grown." How this can be is not clear, unless, like the Jerusalem artichoke, it possesses the power to procure its mineral constituents from mere soil without much aid from manure.

According to careful analysis by Prof. Way of a specimen of hops procured from a field bearing a very large crop, (2240 lbs. to the acre,) there were removed from one acre of the field, of potash 54 lbs. in the hops, 57 lbs. in the leaves, and 23 lbs. in the bines; and of phosphoric acid 30 lbs. in the hops, 40 lbs. in the leaves, and 15 lbs. in the bine. Whatever may be the exact truth on this matter, two points are universally conceded; first, that the hop requires and will pay for liberal manuring, and

* It is said that a concentrated extract of malt and hops is successfully manufactured on a large scale at Rochester, New York.

second, that after successive croppings for a term of years with hops, the land having been well treated, good crops of grain, hay, &c., can be obtained for another term of years with little or no additional manure. To keep a hop garden in productive and profitable condition, an annual or semi-annual application of manure should be made. A few shovels of good compost to each hill, applied in the fall, serve the double purpose of fertilization and of protection to the roots. Various substances are used for top-dressing, which are usually applied early in spring. The best of these are wood ashes, bone dust and superphosphate of lime; and it is recommended by the most successful growers that these be used alternately, that is to say, that one of them be applied one year, and one of the others in each of the two succeeding years.

No definite term of years can be given as the best during which to continue the cultivation of the hop on the same land. This depends much on its original degree of fertility in both soil and subsoil, also on the degree in which it is exposed to damage in the roots in winter, by lack of covering with snow or other causes. In practice I have generally found the term considerably shorter in Maine than in other States, although in one instance a field was pointed out which had been in continuous cultivation for about thirty years, and cases are not unusual of half that time.

When grown in a congenial soil and well cared for, the durability of the plant is very great. In some cases they have flourished for upwards of a hundred years, and it is asserted that in Mr. Paine's celebrated "Heart Gardens" they have been continuously grown ever since the culture of the hop was introduced into England—say three hundred years or more.

FORMING OF PLANTATIONS.—The site of the hop field having been decided upon with reference to character of soil, security against high winds, and other desirable conditions, the land is to be prepared very much as for Indian corn, except that it needs to be more heavily manured than are most of our corn fields, and it should be not only plowed but subsoiled. If not dry enough naturally, underdraining is very important. The manure should be spread and well incorporated *near the surface*, deep manuring being profitable. The distance between the hills may be seven or eight feet; the first giving, if in squares, 889 hills to the acre, or, if planted in triangles, 1025 hills. At eight feet apart, and in squares, we have 680 hills per acre. It is usual, and in fact almost universal practice, to plant cuttings of roots, two to five to

each hill. Two plants only are required to form the hill, and if the cuttings are good and carefully planted, and the season favorable, only two pieces of root need to be used, but often three, four or five are planted. A surer method, and one considerably practised in England, is to plant what are called "bedded sets," that is, to have the cuttings grown one year in a nursery upon good soil before permanent planting in the hop field. Two of these "sets" only are used, and failures even in dry seasons are very rare. The first season of planting, Indian corn, potatoes or other hoed crops may also be planted on the ground in the vacant spaces, as the hops need to occupy not more than a quarter or third of the land.

In the spring of the second year the poles are set, and from this time no other crop nor weeds should be grown with it.

Two poles generally go to each hill, and two of the strongest and thriciest bines to each pole. These when about two feet high are secured by some slight fastening.

The furnishing and replenishing of hop fields with poles is a considerable item in the expense of cultivation. In this regard, however, the grower in Maine has a marked advantage over the one in England or in New York. Their length should be from sixteen to twenty-two feet—depending on the richness and strength of the soil, and the natural degree of vigor of the variety which is grown. Cedar, larch, (often called hacmetac,) and spruce are preferred, and with care will last eight or ten years. Elasticity in a hop pole is a quality much preferable to stiffness. They should be set firmly in the grounds so as to resist the winds. These being injurious to the plant in other ways than by blowing down poles, it is highly important, other things being equal, to select a locality well sheltered by some natural provision, as by hills or forest growth.

Latterly, a horizontal method of training has obtained in some sections, for which it is understood a patent is claimed, and is by some highly commended. F. W. Collins, of Rochester, N. Y., (whether interested in the patent claim or not I do not know,) in a recent communication to the Farmers Club connected with the American Institute, speaks of it as follows :

"The roots should be set eight feet apart each way. A free exposure to the sun and air is as necessary to the hop vine as to the grape. The common plan of training a mass of hops up a 20 to 30 foot pole is as detrimental to the perfect development of the

fruit as would be the same method with the grape vine. The fruit-bearing arms, few of which are thrown out less than seven feet from the ground, need to hang freely in the air to do well. In the horizontal method of training hops four vines are allowed to run up a stake seven feet in height, when they are separated and trained upon twines stretched across the yard in both directions, by which means the fruit-bearing arms, hanging freely from the twines, receive all the light, heat and air requisite to ripen the fruit and prepare it for harvest several days earlier than hops grown by their side upon long poles. The twine used may be that known as wool twine or broom-makers' twine, either flax or hemp. The best way is for each hop-grower to raise a bed of flax and hire his twine spun. A man or boy upon horseback, with a basket of twine fastened to a belt, should put the twine upon the stakes. Fastening it securely to the strong outside stake, he should ride along the row, winding it once around each stake, at the top, to the end of the row, where it is again secured. The same process is repeated for each row in both directions, and thus a network of twine is spread over the yard seven feet above the ground. Occasionally the hop-grower should ride through the yard and place the vines upon the strings. Standing with his back to the stake he should place the vine over the string with his right hand, and receive it underneath with his left—to let it grow with the sun, and it will show no tendency to leave the twine.

The stakes may be either small round, split, or sawed, except the outside rows, which should be as strong as ordinary hop poles. They should be cut eight feet in length, and set one foot in the ground. The outside rows of stakes in each direction should be placed one row outside of the outer row of hop plants; this will prevent any crowding in the outer rows of the yard, and add much to the neatness of its appearance. Indeed, I do not know of anything more beautiful in the line of agriculture, than a hop yard trained as thoroughly as it should be in this manner. That it is the most profitable crop a farmer can raise does not prevent its also being the most attractive to an artistic eye.

The saving in the expense of training a yard in this manner is worthy of note. By the old method two poles, from 15 to 30 feet in length, were necessary to each hill; by the horizontal method, one stake eight feet in length, with 17 feet of twine, is all that is required. Seven hundred stakes, eight feet in length, take the place of 1400 expensive hop poles. Prices vary in different portions of the country, and yet the relative prices remain the same.

In picking hops the universal practice has been to cut off the vine, raise the pole, and carry it with the vines to the box, leaving the roots to bleed freely. By this means the roots are all greatly weakened, and the stronger and most vigorous plants, if they survive the trial, prove the weakest plants the ensuing season.

Canada thistles would scarcely survive the treatment in this respect, which has most thoughtlessly been practiced upon hop vines. By using stakes and twine the necessity for cutting off the vine at the root is obviated. The box-tender, by the aid of a stool, if necessary, can reach every arm and cut it from the vine without injuring the vine that is left, and this secures a strong, vigorous plant for another year."

ENEMIES.—In other sections the hop is liable to injury from a variety of causes, which are either unknown here or operate to so small extent as scarcely to affect results. As before remarked the only serious obstacle thus far encountered by growers in Maine is from the ravages of the hop louse, so called. It is not properly a louse at all, but an aphid—one of a numerous family to which many plants are subject—a little green, semi-transparent insect, the females wingless and the males winged. They operate by sucking the juices of the plant. They are formidable from their numbers. Being endowed with most marvellous fecundity they increase with unparalleled rapidity—each female producing a dozen or twenty daily, and these in turn very soon issuing progeny with like dispatch. If no hindrance to their increase occurs, loss of vitality rapidly ensues, and a blight to vine and leaves and prospect of crop is the result. Fortunately it has natural enemies which oftentimes hold it in check, and sometimes cause its sudden and mysterious disappearance. Another insect, the lady bug, or lady bird, is most efficient in this work; and sometimes their entire disappearance follows some peculiar condition of the atmosphere, the nature or causes of which are very imperfectly or not at all understood, and are not under our control. As for remedial measures, so far as I can learn, the same which are effective with the aphides which trouble other plants are equally so with these. Every gardener knows that the aphid cannot abide tobacco either in smoke or in decoction, and also that a solution of Whale Oil Soap* very quickly destroys them.

* The Whale Oil Soap here referred to is not a soap made from whale oil and for this use, but it is a side product of the purification of crude whale oil. This last is treated

I would recommend the keeping of a sharp outlook for the aphid and on its first appearance, the application by means of a syringe, of a decoction of tobacco, in which is also dissolved a portion of whale oil soap, prepared somewhat as follows:—Take of coarse cheap tobacco, one pound, and steep it in two gallons of boiling water until its strength is extracted, and then add a pound of whale oil soap; when this is thoroughly dissolved add five gallons of water—perhaps it might prove strong enough if eight gallons were added. In many places, refuse stems might be procured of the tobacconists very cheap, which would answer equally well by using double or treble the quantity. The application should be repeated until they disappear—because if all the living ones are killed to-day there may be a new crop hatched out to-morrow or next day. The trouble is not so much to kill or destroy a few thousands or scores of thousands as to reach the whole number.

Some very good cultivators think it quite as well not to attempt any remedial measures whatever, but to let them alone and take the chance of some providential interposition in their behalf, or of the loss of the crop.

In order to give the views of some of the best hop-growers as recently expressed on various points connected with their cultivation, I subjoin herewith an essay by John P. Smith of Worcester, England, which received the prize offered by the Royal Agricultural Society, and was recently published in their Journal:

“The hop thrives best in moderately warm climates, and this may account for Kent and Sussex, two of the most southerly counties, being selected for its cultivation, and producing a very large proportion of the annual yield of the kingdom. Worcester and Hereford stand next in importance, and yield about one-eleventh of the yearly average growth. Farnham and its neighborhood stand next as to quantity. The district known as the North Clays, in Nottinghamshire, formerly grew a fair quantity of good hops, but of late years the plantations have been much re-

with alkali which combines with matters which it is needful to extract in order to render the oil fit for the common uses to which it is put. It also combines with a portion of the oil, and the product—sometimes light colored and tolerably clean and sometimes dark, rank and offensive is what is sold at agricultural warehouses, mostly for horticultural uses, as Whale Oil Soap, and is the most reliable application known for the riddance of numerous insects injurious to vegetation. One pound is enough to dissolve in from three to five gallons of water, according to the strength of the soap and to the toughness of the insect enemy and his powers of resistance.

duced; the same remark applies to the district around Stow Market in Suffolk, and also to the county of Essex.

A southeastern aspect affords, in my opinion, the best situation for a hop-garden, and if it be well protected from the west winds that prevail during the autumn, so much the better, as great mischief is often done by wind. Due care must be taken to adapt the planting to the peculiarities of the soil. The Golding hop will be found to succeed best on dry friable soil, with a gravelly or rocky subsoil, such as we find in the hilly districts of Middle and East Kent, whilst Mathon White, and Grapes, prefer a stronger soil, approaching to clay; the former variety flourishes on the deep land in the vale of the Teme, and the latter in the Weald of Kent and Sussex, which is mostly strong clay soil. Another variety, Cooper's White, a good sort, but delicate, is best suited for good strong *loam*. There are besides several kinds of red hops that are not approved by the brewer, and, in my opinion, cannot too soon become extinct; they are mostly grown on the poor lands of Herefordshire. Many other kinds are grown in Kent and Sussex, viz., Golden Tips, Pheasants, Golden Grapes, White Bines, Grapes, Jones's, &c., and a sort introduced some few years since by Mr. Colegate, and known by his name. This is a hardy variety and heavy cropper, but subject to blight, and repudiated by the brewer as a rank bad hop, yielding a most unpleasant flavor to the beer. A young planter should avoid this variety if he wishes to obtain a good character for his growth.*

We will now assume that a suitable field—one that has been thoroughly drained—has been selected, and the preference given to an old piece of turf; in that case I would recommend that the land be trenched two spits deep, the top spit being kept uppermost, with the turf downwards. When the digging is finished, the surface should be harrowed, and rolled down as fine and level as possible, ready for setting out. The planter must next determine on the arrangement of the rows, whether on the angle or the square, and the distance from plant to plant. The usual method

* Let me here give a caution against relying too confidently upon what may be said of the comparative merits of varieties when grown elsewhere. It is true that but little proof has yet been had, in this State, of the various esteemed sorts grown in England, and much more is needed; but what there has been shows that it is much safer and better to rely upon the results of experience here rather than upon reports from abroad. It is very desirable that all the most promising sorts should have a thorough trial here, but the *trial* should be on a *limited scale*, and continued until its merits or demerits are clearly established.—S. L. G.

in Worcestershire and Herefordshire is to lay out the rows 7 or 8 feet apart, and set the plants $2\frac{1}{2}$ to 3 feet distant in the rows. If your land be good, and likely to be highly farmed, a uniform distance of 7 feet square may be recommended; good cultivation will ensure a large quantity of bine, and a sufficient quantity of sun to bring the fruit to perfection, whilst at this distance you have more room to cultivate without injuring the bines.

If this plan is adopted, you must prepare 889 small sticks, a foot to 18 inches long, for every acre, that being the number of hills which an acre will take at 7 feet square. First square your field, and then commence in the centre, working right and left; you will thus be more likely to be correct than if you begin on one side.

Your field being truly set out, you may prepare for planting; if you plant bedded or yearling sets (which are far preferable to cuttings), a man should take a spade and remove the soil from two sides of the stick, the opening being 2 inches wide at the top, and 4 to 5 inches at the bottom, which should be deep enough to let the roots lie straight. Two strong-bedded roots are sufficient for a hill, but if not strong, 3 may be better. Care should be taken to bring the head of each root as close to the stick as possible, some good fine soil should then be put to the roots, and made firm with the foot. For a plantation of 20 acres, with suitable oasts and cooling rooms to dry and cool the crop in one month, for a first-class growth, the following varieties are recommended:—5 acres of Cooper's White, or 3 Coopers and 2 Jones's; 6 acres Mathons; 6 or 7 acres Goldings, and 2 or 3 Grapes; but this distribution of sorts must, in a measure, be governed by the quality of the land, that variety being most largely planted which is best suited to the soil. The crop ought to be secured in three weeks, or certainly not more than a month; and it is most important to have an early sort, such as Cooper's White, or Jones's, to commence with, then will follow your Mathons, then the Goldings, and lastly, the Grapes, a hardy sort, which will hang well for the last picking. Jones's are serviceable to use up old poles. The writer has seen a ton an acre on 7-foot poles. If, as is mostly the case in Sussex, one variety only be planted, you must begin to pick before your hops are ripe, or have a considerable proportion brown before you can finish.

If the planter should determine on a piece of old tillage, I recommend him to plough 10 inches, and subsoil as deep as he can; the

ploughing completed, he will proceed the same as if it had been a meadow, with this exception, that after the sticks are truly set, he should dig holes 2 feet in diameter, and 2 feet deep, placing the top or best soil on one side, and the bottom soil on the other side of the hole obliquely, so that the heaps may not interfere with replacing the sticks when the holes are refilled. Good dung or rather a rich compost should be wheeled on, and a fork or shovel mixed with the *best soil* after the hole has been half filled with good soil from the surface; this being finished, you must readjust your sticks, and when your soil has had time to settle, you may proceed to plant in the manner before described. On no account bury your manure. Should the weather be favorable, and your roots get a start, they will require two poles to each hill 6 to 7 feet long, and if the season be good, a crop of 2 or 3 cwt. an acre may be grown; if cuttings are planted you lose a year.

Potatoes and mangold are frequently planted between the rows, and an ox-cabbage between each hill; this will, by many, be condemned, but much depends on the condition of the land and the disposition of the planter to make compensation to the soil for what has been taken out by the green crops by a dressing of manure, which must be applied in the winter and dug in. Turnips may be planted if the land admits of their being fed off; and this plan, if oil-cake or corn be given, will manure the land at a cheap rate, greatly to the benefit of the hops.

February and March are the months best suited for throwing down and cutting, the land being first ploughed or dug. If the plough is used, a slip from 12 to 15 inches wide is left. Your men will commence digging these slips, cleaning the hills, and cutting the roots; this finished, your poles must be spread, and your pile rows ploughed, dug, and cut the same as the rest.

In the course of a fortnight or three weeks the bines will begin to appear, when no time should be lost in pitching the poles, which should be set by line to ensure regularity; the poles for this season, if the roots are strong, may be from 10 to 12 feet. The next operation is tying, but the tyer should first go over and take out the rank hollow bines; these should, on no account, be put up the poles, since they have a tendency to grow to an extravagant quantity of bine, without bearing a proportionate quantity of fruit—the next and less vigorous bines will be found far more fruitful. Some planters put three bines up each pole; if four poles are put to a hill, which is the custom at 7 feet square, two

bines will be found sufficient; if three poles, put two twos and a three. The tyers are paid by the acre, and go over the hills three or four times until the poles are furnished, when all superfluous bines and weeds are pulled out. This completes the tying, except by ladder, which is paid for extra. The men now follow, dig round the hills, and put a shovelful of soil into each hill—this prevents new bines from springing up.

Different varieties require different sized poles. On no account overpole, as much injury has resulted from it; 14-foot poles are long enough for any variety except Goldings, and for them I would not, as a rule, exceed 15 feet. Jones' will do well with 8 feet; Grapes 10 to 12; Coopers 12, and Mathons 12 to 14 feet, according to cultivation and quality of land. When your hops are tied, no time should be lost in working them with the nidget or scuffle, followed by the harrow—this should be done both ways. All working should be finished by the 1st of July, certainly by the 10th; considerable mischief is often done by working too late, unless in years of blight. When you have vermin on your bines, do nothing to your land—leave them until the vermin disappears—then go in with all your strength, nidget both ways, and do all you can to put fresh vigor into the plant. Some planters manure in the winter, and some both winter and summer; but this may be carried too far for quality, and produce mould. The plan adopted in summer is to wheel in good dung or compost, take the soil from round the hills, put in the manure, and dig it in; or spread the compost (which I prefer) round the hills on the surface and dig in. All that is necessary after is to use your nidget, and harrow both ways, taking care not to pull up the dung. This should complete the work, unless hoeing is required to keep down annuals.

Picking commences in early seasons from the 1st to the 8th of September; in late ones, from the 15th to the 20th. Before it begins, due provision should be made, and everything got in readiness; cokes may be sent for in July and August, and a sufficient number of pickers engaged to keep your kilns or oasts properly at work. In this you must be governed by the size of the hops. Different plans are adopted in picking and measuring; some measure by tally, others by book and cards representing the number of each crib or bin. I have found it best to put two cribs into the centre of 100 hills; this is called a "house," and the cribs re-

main until the work is finished. The poles will be in two heaps at either end of the cribs, and in the proper place for stripping and piling. If this is strictly carried out, much trouble is saved in piling the poles. When a sufficient number of sacks are picked to load one kiln (and this should be done before breakfast), they should be taken and put on the oast, and so on until all your kilns or oasts are loaded; and it should be so managed that hops enough be picked to reload the kilns at night.

Hop-drying requires great attention, and the *slower*, in reason, they are dried, the better. They should be dried by a current of hot air being continuously passed through them, and not by combustion. Many say they can dry hops in seven or eight hours; rely on it, it is better to take twelve, and let your heat not exceed 112 to 115 degrees. When the hops are sufficiently dried, the fire should be raked or allowed to go down, the hops remaining on the kiln until they become soft, which will prevent their breaking on being removed to the cooling-room. These hops will be fit to be bagged the next day, and with a proper staff this should be carried out through the picking.

Poles are a heavy item in the cost of hop-cultivation, and should be carefully husbanded. Their wearing value may be *doubled* by pickling $2\frac{1}{2}$ feet at the sharpened end with creosote. A tank for the purpose must be erected of size in proportion to the plantation. By the application of creosote, soft wood, such as that of the willow, &c., becomes hardened, and equal to ash or other more durable sorts.

The writer has a plantation of 75 acres, and a tank 12 feet long by 5 wide, and $3\frac{1}{2}$ feet deep. This tank will hold 1000 best poles put to stand up. The tank must be filled with creosote within 8 inches of the top when the poles are in, when water fully 2 inches deep must be added to prevent evaporation. The tank should boil slowly twenty-four hours, when the poles may be removed and the tank refilled. Care must be taken that the tank does not boil over, as creosote is most inflammable and may take fire. I am so satisfied as to the value of creosoting poles that I never intend to put a new pole into my ground without its aid. If poles were pickled one year under another, and stored in a stack till dry, they would be found to last far longer than if used in a green state.

The hop-plant has a variety of enemies; on the first appearance of the bine it is frequently attacked by a *flea*, which checks its growth, and makes it look scrubby and unhealthy, but never destroys the crop. Wireworms are a great pest; the best plan to

get rid of them is to cut a potato in half, and place it close on either side the root an inch below the surface; the potato lures the worm, and, if taken up every other morning for a fortnight, enables you to take a great quantity; I have known of a dozen being taken from one root. The greatest enemy is the *aphis*, and I regret to say that on the most important subject of its history we are as ignorant as our forefathers; we go to bed leaving our garden free, and next morning we find *aphides*—from one to ten or twenty—on a small leaf, which in the course of a week have increased to countless myriads. These pests are followed by nits and lice, which some seasons multiply so rapidly as to destroy the bine and the planter's prospects. I would here repeat the recommendation which I have already given to the planter, not to work his hops when in a state of blight. When closely watching the blights of 1860, '61, and '62, I have observed that in all cases where the land was best tilled, manured, and cared for, the blight remained until too late in the season for the chance of a crop; on the other hand, where nothing was done, but weeds were suffered to grow nearly half-way up the poles, the bine became yellow and clean, and the result was a fair sprinkling of hops; in such ground, the vermin had left the hop for want of sap and taken to the weeds.

Of late years a machine has been used to pack the hops, which is very useful when there is a very large crop, as it enables you to pack your hops much sooner. Treading up is preferable, if care be taken to have the hops in a fit state not to break under the foot; if allowed to become *too* cool they are hard and lumpy in the sample, and are termed *cold*. A master's attention to the state of his hops before bagging is most necessary to good management. Hops are picked in Worcestershire and Herefordshire far more free from leaves than in Kent or Sussex. They should be sent, if possible, to the oast without a leaf, dried slowly, taken off the kiln in a *soft*, not a brittle state, and trod into the pocket as soon as sufficiently cool; they do not then break under the foot. In Kent and Sussex hops are dried in a variety of ways, and with several kinds of fuel. In oasts on the Cockle principle anything may be used, and a considerable quantity of sulphur is required; but on the open fire principle Welsh coal and coke is used, and a small quantity of sulphur.

The cokes we get from Abberly and Pensax, in Worcestershire, are highly charged with sulphur, which will account for so little being added in these counties. Its only value is to give brilliancy

to the sample, and, if used in excess, brewers object to it as affecting the fermentation of their worts.

It has been the practice in Worcestershire and Herefordshire to make eight sacks out of one piece of cloth of 36 yards, and the weight of the pockets when filled run from 1 cwt. 1 qr. to 1 cwt. 2 qrs. It is my practice to make seven sacks from a piece, and I am thereby enabled to get 1 cwt. 2 qrs. to 1 cwt. 3 qrs. into a pocket, and I would respectfully recommend my brother planters to do the same. A heavy pocket has many advantages over a light one; you pay less for weighing, portorage, and warehouse rent, and you get your hops more quickly into consumption.

It was formerly the practice to roll, riddle, and otherwise break and spoil good hops; this silly practice is in a great measure exploded. Plant the best sorts, such as Coopers, Mathons, and Goldings, pick them clean, dry them properly, and put them into the pockets as whole as possible. By breaking the hop you lose a large quantity of the pollen, which contains *the most valuable brewing properties*.

The cost of hop cultivation per acre may be estimated as follows :—*

	£.	s.	d.
Yearly charge for poles,	5	0	0
Ploughing down,	0	10	0
Digging slips (or portion not ploughed,)	0	5	0
Cutting, picking up, and burying roots,	0	4	0
Spreading poles,	0	2	0
Pitching or setting poles,	0	12	0
Tying,	0	8	0
Nidgetting or scuffling 4 times,	1	0	0
Harrowing 4 times,	0	6	0
Forking round hills and hilling up,	0	5	0
Stripping and piling poles,	0	8	0
Resharpening broken poles,	0	3	0
Ploughing up before winter,	0	10	0
Manuring, if with dung, 20 loads per acre, at 8s.,	8	0	0
If manured in summer,	4	0	0
Ladder tying,	0	2	0
	£21	15	0
If you dig, instead of plough, 15s. per acre extra,	0	15	0
Total,	£22	10	0"

* In order to compare these prices with our present currency, let the pound sterling be reckoned at five dollars, (the shilling at twenty-five cents.) and then add to this the current premium on gold. The comparison will be suggestive of various and wide differences between culture in New England and old England.—S. L. G.

A recent anonymous writer in the New York Tribune furnishes an interesting paper on hop culture, from which we quote the following :

“The New England hop district has been much longer engaged in the cultivation of this crop than the New York. It was first enunciated among the crops of the United States in 1840, when the product of the entire country was 1,200,000 pounds. It had, however, been a market crop in New England as early as 1806, and perhaps earlier. In 1833, the product of that district was 1,136,134 pounds; in 1834, 1,174,599 pounds, and in 1836, 1,441,936 pounds. From this amount it fell off rapidly, and in 1839, the year of the census of 1840, only 452,225 pounds were raised. That district has never since regained its position in 1836, though its annual product now ranges from 600,000 to 1,000,000 pounds, about the product of some single towns in New York. In 1850, the culture had made some progress in New York, where it commenced about 1842, and 3,400,000 pounds were reported for the whole country. In 1860 it had risen to 11,000,000 pounds, and in 1862 to 16,000,000 pounds. Since that time it has fallen off, being 13,000,000 pounds in 1863, and not much over 9,000,000 pounds in 1864. In 1865 it was probably still less in quantity, though somewhat better in quality. The crop of 1866 promises to rival that of 1862, the area devoted to the crop being greatly increased, though the yield per acre may be somewhat less. The fluctuations in the quantity produced, as well as the equally remarkable variations in quality, are caused by the weather, by injuries from insects, by blights, and mildew. The crop is subject to much greater fluctuations in Great Britain, than here. From 38,000 to 52,000 acres are devoted to hops in England, about half the amount being in the county of Kent, and the yield per acre ranged within 30 years from 120 to 1,465 pounds, the yield varying sometimes in successive years over 1,100 pounds to the acre. The years 1861, 1862, and 1863, which were good years here, were years of very small crops there, and the import into Great Britain in each of those years was about equal to the entire American crop.

Having thus given some of the statistics of the hop crop in the aggregate, let us suppose that some enterprising young farmer is desirous of trying his luck in the culture of the plant, and asks our advice as to the steps he shall take. Our first inquiry would be as to his means, for some capital is required for this business.

A man with less than \$1000 had better not undertake it, and he will manage it much more profitably if he has \$5000 or \$6000. If possessed of the latter amount, the first step will be to select his place for a hop-yard. Hops will grow on good ground anywhere, but there are several advantages in selecting a place where there are other hop-growers near by; a better market, greater facility in procuring what is needful for the cultivation of the crop, and experienced tyers, grubbers and pickers, are among these. New land is better than old, and a light loam, easily drained, than a tenacious clay. The young hop-grower should be cautious in regard to buying too much land. A half-dozen acres, whether it cost much or little, will be sufficient for his first hop-yard, unless he possesses a large capital. He can cultivate more subsequently if he desires. He will need a few acres beside for his house, barn, hop-house, garden, and pasture. Let us see, now, what his outlay must be. We will suppose the place he has selected is in a farming region, somewhere in the New York hop district, at a distance of two or three miles from any considerable village. He purchases, we will say, 25 acres, including a small, but comfortable house, and a good barn, for \$2000. His land is in fair condition, and he selects a plot of six acres, which has been a sheep pasture, for the hop yard. Plowing this twice, (and he must have a pair of horses worth in the neighborhood of \$350 for this and other purposes,) he works in from 40 to 50 loads of barnyard or stable manure to the acre. The land must be rich, and barnyard manure is, perhaps, with the addition of lime or plaster of paris, the best dressing he can give it. Here will be a further outlay of at least \$300, as, buying his farm, he has no manure accumulated. His next work is to lay out his hop-yard. The roots should be set seven feet apart, each way; at least this is the general rule, though some hop growers set them at 6 feet, $6\frac{1}{2}$ feet, $7\frac{1}{2}$ feet, or 8 feet. The "rough roots," as they are called, required for setting, he can procure from some neighboring hop grower, at from 50c. to \$2 the bushel, and he will require about five bushels to the acre, or to be exact, if his hills are seven feet apart, 888 plants; the cost for roots being thus from \$15 to \$60 for the yard. It will be well, however, to procure some excess over the exact amount, as there will be gaps to be filled. Of the prevalent varieties, he will do better to select the Cluster, as it is less liable to disease than the Grape, though perhaps not quite so rich in lupuline. As he will get no return from his hop roots the first season, he will do

well to plant corn, not only in the hills with the roots, but in the intermediate spaces, making 3552 hills of corn to the acre. With a favorable season, his crop of corn will prove a most decided help to his finances.

As the hop plants come up, they will require supports, for the hop is a rapid climber. Some put up small cheap poles the first year, and set their permanent ones the second year, but this is generally regarded as a needless expense. The hop poles, however, are a very serious item of expense in New England and New York. The Grape and Cluster hops are both strong and heavy vines, and require poles from 16 to 20 feet in height, and 2½ to 3 inches through the butt. The New York hop growers prefer cedar, as being more durable. They are worth, in most parts of that district, about 15 cents each, when sharpened and ready for setting. As two are required to each hill, he will require 1776 to the acre, and his poles for six acres will cost about \$1600. These poles will last, however, without renewal, not far from 15 years.

Some hop growers reduce the first outlay, materially, by purchasing but half the number of poles, and setting to the hills of every other row a stout stick about four feet in height, and using twine to connect these short stakes together, and to stretch from them to the top of the taller poles on each side. This has the advantage of exposing the hop vines more fully to the sun, and perhaps increases the yield somewhat, but the cost of the twine, which must be renewed every year, and the trouble and expense of the tying, makes the ultimate outlay about the same as the supplying of poles for each hill. On the continent of Europe another plan is adopted, which is perhaps less expensive, but we doubt if it would answer as well for our vigorous and rapid climbing varieties. Along each alternate row a post, say three and a half inches in diameter and five feet high, with the bark on, and both ends dipped in a preparation of creosote, is set to each hill. A stout iron wire is run along the top of these, fastened to each by a small staple. The alternate rows are provided with small stakes, rising not more than a foot above the ground, from which strings run to the iron wire for each vine. These are much simpler and more easily replaced than those already described, but hardly afford sufficient room for the vines.

If poles are used exclusively, the second year they will require tying together at the top, and many hop growers connect adjacent hills together. Early in the season, too, a careful search for grubs

is necessary, and this can hardly be done in season by the hop grower and his single man of all work ; usually he must secure the services of several men, boys, or girls, in this search. It is indispensable that the hop-yard should be kept free from weeds ; and as in our dry climate it is better to plant flat than in hills, the careful use of the cultivator two or three times in the season, with a little help from the hoe, will generally suffice for this purpose.

At some time between the first setting of the hop plants and the season of picking, in the ensuing year, our young hop grower must erect his hop house and kiln. For his little yard one kiln will answer, though two would be better. The kiln should be of stone except its pointed top ; below it should have a furnace, and hot and cold air chambers ; above these, at a height of from 12 to 16 feet, should be the drying floor, circular, about 18 feet in diameter, floored with slats an inch and a half wide, and the same distance apart, and these covered either with hemp matting or a galvanized wire cloth. The pointed top should be crowned with a swinging ventilator, which will permit a free passage of air in whatever direction the wind may be. On a level with the drying-room, is a cooling room, fully ventilated, where the hops may be laid to cool and lose their excessive bitterness, and from this they are passed to the room below, where they are pressed and baled. The cooling and packing rooms can be a wooden building. The expense of the kiln and hop house, if only a single kiln is put up, will be about \$2000.

At the close of the second summer, our young friend comes to his first experience of hop picking. This, in the hop growing districts, is the gala time of the year, the epoch from which everything dates, and to which housekeepers and housemaids alike look forward, the one with anxiety, the other with the most joyous anticipations. All that Christmas and hiring time were to the Southern housekeeper, and more, is hop picking to the Northern matron in the hop district. It is the universal hegira of the maids of the kitchen ; no wages can induce Bridget or Mary to do housework during the three or four weeks when their services are in demand by the hop growers. If nimble-fingered and active, they can earn \$2 or \$2 50, aside from their board, daily, and their employers feed them well ; then the change in their work, and the assurance of having "a good time generally" with their associates, adds to the pleasure. Hop picking is, nevertheless, hard and fatiguing work. The pickers begin at or before sunrise, and,

with a half hour's nooning, work as long as they can see. The hops are commonly picked in large boxes, containing from 24 to 40 bushels. These boxes are divided both by a longitudinal and transverse partition of thin lath, into four compartments holding from six to ten bushels each. They are raised a little from the ground, and have handles at the ends to facilitate their removal from place to place. One man and four women, girls, or sometimes boys, are assigned to each box. The man is called the box-tender, and it is his business to supply the boxes with poles, which he raises from the ground as needed, cutting the vines about a foot high, to see that the picking is properly done, to remove the poles after they are picked, strip them of the vines, and stack them securely. Occasionally, an active box-tender can serve two or even three boxes. The pickers deposit the hops each in their own division of the box, and are required to put in no leaves or stones, or blasted and immature hops. The boxes should be emptied at least once a day, and no hops allowed to remain in them over night. A swift and skilful picker will pick 30 bushels, or even 40, in a day. The price was formerly only from 15 to 25 cents per box or compartment of eight bushels (beside board); the present season it is 50 cents.

The boxes, as fast as filled, are carried to the kiln, which should not be too distant; usually it is necessary to keep the fires up in the kiln night and day. The morning's picking is put upon the kiln floor at noon, being spread evenly to a depth of eight to twelve inches, and the temperature regulated to the proper degree of heat, which may be at first quite high, and the steam and water of evaporation from the hops must be allowed free egress through the swinging ventilator at the top. Some hop growers have a tube which carries the hot air above the hops, and then throws it over the surface. Cool air should be admitted from below, to mingle with the hot air and force it more rapidly through them. If the hops are rusty or discolored from any cause, it is usual to burn a little sulphur under them as soon as they are well warmed through, in order to bleach them partially and bring them to a uniform appearance. Some turn the hops in the kiln in order to insure their more thorough drying; others regard this as injurious, as tending to break up the hops, which are very brittle at this time, and render them less marketable. In a properly constructed and regulated kiln there is little danger that any portion will be imperfectly dried. Ten or twelve hours are required to dry a kiln.

The picking of the afternoon is usually put on about midnight. When the drying is completed the hops are carefully raked out upon the floor to cool, and, by free ventilation, to acquire sufficient toughness and coherence to prevent their crumbling in packing. After lying for one or two days in the cooling room they are shoveled down a wooden tube or hopper to the packing room.

When the hops are in a proper condition for baling they are thrown into a box, lined with bagging, which forms the lower portion of the hop press, and trodden or beaten down till the box is filled; another piece of bagging is then put over the hops and the press, which, in some cases, causes an iron follower to descend, and in others, forces up the bottom of the box, reducing them to a compact bulk, and the sides and ends of the bale having been sewed (a part of the sides and ends of the box being movable), the pressure is taken off and the bale tumbled out, marked, and it is then ready to send to the warehouse. The bales usually weigh about 200 pounds. The hop presses most in use in New York are Gifford's, Harris's, and Atwell's, all manufactured at Waterville, Oneida county. The last named is a new press, easily worked and much liked. The Harris Press has also a high reputation. American hops are not pressed so solid as the English or Continental hops, the growers believing that the packages, though somewhat more bulky, retain the aroma and volatile oils better than the compact bales of foreign markets.

Up to this point, it has been a constant succession of expenditures for our young hop grower, except what he may have been able to realize from his corn crop and from the residue of his farm; but he has now arrived at a point where he commences to realize the profits of his outlay, though he will not receive the full benefit of them before the third year. Let us now see how the account stands. The purchase of the farm is in the nature of a permanent investment, constantly increasing in value; we will not include that, therefore, in our estimate of the expenditure necessary for establishing a hop-yard, but will put down the interest on the cost of the six acres at 7 per cent per annum as a fair rental of the land. We have then on the debtor side:

Two years' interest on \$480, at 7 per cent.,	\$67 40
Pair of horses,	350 00
Manure, (including plaster of paris for second year's),	350 00
Hop house and kiln,	2,000 00
Rough Roots,	40 00

Poles,	1,600 00
Tying, grubbing, and hoeing,	36 00
Picking,	250 00
Drying and baling,	50 00
Total,	<u>\$4,743 40</u>

Of this sum the hop house and kiln are a permanent investment, and not an expenditure to be repeated often in the cultivation of the hop. The horses and the poles are also items which will not require to be renewed under ten or fifteen years. On the credit side we have :

Increased value of the land comprised in the hop yard,	\$150
Value of corn crop, first year, 75 bushels to the acre, at \$1 per bushel,	450
Hop crop, second year, 1,200 lbs. to the acre, 7,200 lbs., at 50 cents,	3,600
Total,	<u>\$4,200</u>

For the next year there will be only a small outlay for manure, the vines being burned in the hop yard, and the ashes strewed around the hills, and the stable manure and some plaster of paris applied to the hills. The expenditure for tying, grubbing, hoeing, and picking, will be about the same, or perhaps a little more, than the previous year. Five hundred dollars will be ample allowance for all these items. If the season is favorable, and neither lice nor blight affect the hop, his third year's crop should be full 1400 pounds to the acre, and his receipts probably \$4200. This would encourage him to enlarge his hop yard, since the cultivation of a few acres more will enhance his profit without greatly increasing his outlay. It is to be borne in mind that if hops of good quality can be grown, there is hardly a limit to their consumption at remunerative prices. The constantly increasing consumption of lager beer and of malt liquors in this country, and the demand for them in France, where they are to a great extent taking the place of the wines of the country, insures a market for all the hops which can be raised, without taking into the account the fluctuating demand from Great Britain, where in the best years, there are not enough grown for home consumption, and where, often, 15,000,000 or 16,000,000 pounds, or the entire American crop, are imported.

THE ENEMIES OF THE HOP.—Were the hop crop a sure one, or liable to no more accidents than Indian corn, it would be so im-

mensely profitable that thousands would rush into it, and, if that were possible, the market would soon be glutted. But it is, in fact, a somewhat uncertain crop, though less so here than in Great Britain. In that country there is not on an average more than one really good crop in six years, and the average annual yield in any given series of years does not exceed 750 pounds to the acre. Here large crops occur on an average once in three or four years, and the average annual yield is, taking the disastrous years into the account, very little, if at all, below 1000 pounds to the acre, while in such years as 1862 it rises to 2800 pounds to the acre, or nearly double the best averages of the English hop yards.

The *weather*, which in England exerts so great an influence upon the crop, does not seem to affect it much here. A frost early in August would, indeed, produce serious injury, especially to the later varieties; but such an occasion, though, of course, possible, is very unfrequent. The present summer, especially since about the middle of July, has been remarkably wet and cool, yet the crop bids fair to be large and of fine quality.

The *aphis*, or *hop-louse*, is a more formidable source of injury to the hop. The aphides are among the worst enemies of our vegetation, destroying the foliage and fruit of the currant, raspberry, blackberry, and strawberry; infesting the potato, and producing mischief wherever they make their attacks. They have infested the hop for the past three years, blighting whole yards, and rendering their product worthless. They attack the hop in England, both early and late, and the vines, where the grounds are liberally manured, may recover from an early attack, a change of temperature or of the electrical condition of the air often proving fatal to the lice. Here, they usually appear only late in the season, and a hop which ripens by the 10th of August, or even as late as the 14th, would generally escape their attack altogether. When they once attack they multiply very rapidly, a single female *aphis* producing 15 or 20 young a day for two or three weeks, and these attaining maturity in a very short time. They feed upon the sap or juices of the vine, and speedily destroy the vitality of both the leaves and vine, causing them to turn dark brown, almost black. If the hop is fully formed, they speedily attack that also, and in a single day cause it to turn black, and exhale a most offensive odor. If the hop yard is kept rich in manure, the plant will be more vigorous and better able to resist the attack of this destructive insect.

The most efficient natural remedy against the ravages of the *aphis* is its enemy, the *ladybug*, or as it is called in England, the *ladybird*. This insect, which is usually abundant in the hop yards, kills the lice, each one destroying 30 or 40 a day, and if the weather is clear and the *aphis* has just commenced its destructive work, the ladybug will succeed in clearing the vines; but if the parent aphides have succeeded in depositing their young on the under side of the hop leaves during cloudy days, when the ladybug is inactive, they will have some time to carry on their ravages. The ladybug, however, is busy during this time in depositing its eggs also on the under side of the leaves, usually in clusters of about 20 each. These are soon hatched, and the progeny which creeps forth is the "black-nigger" or "serpent," as the hop pickers call them, a lizard-shaped, ferocious-looking little creature, which, as soon as hatched, pounces most voraciously upon the young lice, which are its peculiar food, and unless they are too abundant, clears the vines of them. Having gorged itself for some successive days with the aphides, the "serpent" attaches itself to the under side of the leaf, and after a short period of existence in the larva state, casts off its shell and becomes the perfect ladybug, when it again pursues its good work of destroying the *aphis*. The hop growers preserve, with great care, this useful little insect, regarding it, justly, as one of their most efficient friends.

In 1864, a hop grower of Otsego county, a Mr. Turney, satisfied himself that a fluid preparation which he had compounded would destroy the hop-lice and prevent their ravages, and during 1865 and the present season he has sold it largely. It is applied with a syringe, and is said to benefit the hop plant as well as destroy the *aphis*. He publishes numerous testimonials, from large hop-growers, of its efficacy. It has been tested to a considerable extent, and whether from this cause, or from the fact that the season has been unfavorable to their development, it is certain that they have effected very little injury to the crop the present season. Just as the time of picking commenced they appeared in considerable numbers in some yards, but were too late to injure the hops much, though they had sucked the juices from the bine pretty thoroughly.

The *mould* or *blight* is another of the parasitic enemies of the hop. It is properly a disease of the hop, and is probably a parasitic vegetable fungus usually generated in wet seasons and damp situ-

ations. It has never prevailed so universally in our American hop districts as the lice, but has affected yards planted in low grounds and those which had not a sufficiently free access to air and sunlight. To avoid any tendency to it, the plants should not be set nearer than seven feet apart, and if the ground is low or moist, the method of training the alternate rows on strings or wires and strings, will be found preferable to the exclusive use of poles, as it will favor the more free admission of sunlight and air.

When this blight appears to any considerable extent upon the hops as early as June or the beginning of July, however luxuriant the vines may then appear, there is no hope of a crop worth picking. It is at first noticeable on the upper side of the leaf as a white speck not larger than a small pin's head, the spot increasing in size till it attains a diameter of about an eighth of an inch; below this white spot, on the *under* side of the leaf, there is a corresponding indentation, which renders this incipient indication of mould unmistakable. From the spots on the surface of the leaf the seeds of this parasitical fungus are blown in all directions, and the minutest particle of this white dust, which settles on another leaf, in a few days becomes a speck of mould. Each new spot in turn propagates the disease, and thus we perceive this vegetable pestilence proceed with the fearful rapidity of geometrical progression until, if the season is damp, acre after acre is destroyed. The prudent hop grower will watch carefully his vines, and as the disease commences near the ground, will give special attention to the pulling off of the suckers, which sprout through the hills in the summer months, and to the destruction of every spotted leaf.

MARKETING THE HOPS—has of late years become a distinct business. Formerly the hop growers consigned, or sometimes sold their hops to New York hop dealers, of whom some six or eight monopolized the business, and sold to the brewers here or exported them to England, as they deemed most advantageous. Now, in three or four of the larger villages of the New York hop district, as for instance at Waterville and Cooperstown, there are four or five firms, with ample capital, whose sole business is buying and selling hops. These firms have usually one or more partners who are thoroughly familiar with the qualities and value of the hops which are offered them, and who buy from the growers. Another partner gives his attention to the selling, visiting the breweries throughout the country, and presenting his samples. Most of these firms are in constant communication, directly or indirectly,

with the European hop dealers, and export hops to them, or import from them, as the condition of the market requires. The quotations of prices of hops in Kent and London are received almost daily by these houses during the hop season, and those of the Belgian and French markets weekly. The effect of this establishing of local markets for hops here has been, to improve the quality of the hops and the style of packing; and the analysis of the American hop having demonstrated its greater value for the brewer's purposes, it is gradually working its way into foreign markets as a high-priced hop. The hop grower profits, also, by the establishment of these local markets, in being able to obtain a better price for his crop. Formerly a very large share of the profits went into the pocket of the dealer, and the grower was at his mercy; now the profits are, as they should be, mostly with the grower. The prices of hops in the New York market, on the 1st of May, of each year, from 1855 to 1866, were as follows:

<i>Per Pound.</i>		<i>Per Pound.</i>		<i>Per Pound.</i>		<i>Per Pound.</i>	
1855,	19c.	1858,	8c.	1861,	16c.	1864,	28c.
1856,	9c.	1859,	13c.	1862,	15c.	1865,	35c.
1857,	10c.	1860,	10c.	1863,	20c.	1866,	65c.

It is not probable, that the price will, for many years to come, be as low as it was in 1857, 1858, and 1860. The cost of production is now about 13 cents per pound, and the demand is such that prices will, in all probability, range in the neighborhood of 50 cents per pound."

THE VALUE OF NIGHT SOIL.

"Gather up the fragments, that nothing be lost."

The possession of ample resources is never a warrant for waste. How well, then, does economy become those whose resources are limited by narrow bounds.

An indispensable requisite of successful farming in New England is a sufficient supply of manure. It matters little whence this is obtained, so long as it possesses the needful fertilizing properties.

The most fertilizing substance at the command of our farmers is, with few exceptions, utterly neglected, wasted, lost. This seems to be due, in varying measure, to two causes—ignorance and prejudice.

Such is not the case with hundreds of millions of people who till the ground for a livelihood, and whom we look upon as far beneath us in the scale of progress, enlightenment and civilization.

We depend chiefly upon our barn yards to furnish manure for our lands. Those millions have no cattle and no barn yards, and yet they annually apply manure enough to their land to insure good crops.

Their resource is equally at our command. They employ it. We ignore it.

I do not argue that because the Japanese and Chinese have accomplished the difficult task of maintaining for centuries together a high degree of productiveness, therefore we should imitate them in all things; live upon grains, without meat, reduce the size of our farms to three or four acres each, or copy divers other of their ways; but I may pertinently ask whether we may not learn a useful lesson from their successful practice. One important item in that practice is carefully and diligently to save every particle of human excrements and to fertilize their land therewith. It is their almost exclusive dependence for this purpose. With this practice a far greater number of persons are supplied with food from a given extent of surface than are fed

from a similar area in any other part of the world. The facts in their case show conclusively, that what may be saved from the food which supports a given number of persons will, if applied to the soil, more than reproduce the amount of food consumed.

My aim at this time is not so much to present an elaborate article upon the composition, properties and uses of night soil, as to call attention to the subject, and to suggest an easy and simple method whereby a great waste may be stopped, a valuable addition made to our means of fertilization, and at the same time, in many cases, an offensive, injurious domestic nuisance wholly obviated.

I suppose the efficacy of night soil as a fertilizer will be readily admitted, and that no need exists of presenting evidence on this point. It is generally understood that the value of excrementitious manures depends chiefly upon the character of the food consumed by the animal yielding it. Everybody knows that what is dropped by cattle fed on straw and bog hay is inferior to that from cattle fed upon good hay and grain. As no other animal is so well fed as man, the excrements of no other possesses so great fertilizing powers as his.

It is also true that no other is liable to such rapid loss of a large part of its manurial value. In warm weather it very quickly passes into decomposition, ammonia is evolved, and waste goes on with unexampled rapidity.

Whoever purchases the contents of vaults, as commonly managed, under the impression that they embrace the whole, or the half, or the quarter, of the fertilizing capabilities of what has gone into them, will, most likely, find himself egregiously mistaken.

To preserve from loss it is needful either that the night soil be immediately applied, which is practically out of the question, or else that it be mixed with some absorbent substance, which is easily done. For this purpose dry peat or muck is perhaps the best, and where easily available an abundant supply should always be at hand. A double advantage is obtained by its use, for besides the primary one of deodorizing the excrement, and preserving all its capabilities, the vegetable matter of the muck is itself converted into valuable and immediately available food for plants.

If peat or muck be not at hand, an equally effective substitute will be found in common dry earth or ordinary loam, and that which contains a fair proportion of clay should be preferred to what is mostly sand, for the reason that the absorptive power re-

sides in the clay, and were it not for the trouble of reducing stiff clay to a fine powder, this would be recommended instead of loam. The latter, however, usually answers well enough.

The method proposed is simply this :—First, to have in connection with every privy a sufficiently capacious reservoir of peat or loam, and to be sure that it is filled at a suitable season of the year with *fine dry* material.

Second, to arrange some simple contrivance whereby a proper quantity of this can be dropped, *daily*, upon the deposits left there ; and, lastly, to do so.

This method, proposed some years ago by a writer in the Journal of the Royal Agricultural Society of England, has been tried by the writer, and he testifies from experience that an amount of fertilizing matter altogether surprising has thus been saved. The testimony of many others is equally to the same point.

ADOPTION OF THE DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

Congress having recently authorized the use, in the United States, of what is known as the Metric System, and as it is likely, before long, to be exclusively used, it seems well to employ all practicable means to diffuse an acquaintance with its merits and its methods. It may be of greater importance to the commercial than to the agricultural classes, but all are deeply interested, and I have thought some remarks here would be useful and well-timed.

Hitherto the States have prescribed their own standards, and as these are often unlike, we seem to be drifting towards a state of confusion like what prevails in some older countries. How serious such confusion might become is well shown by a few facts regarding what exists elsewhere. An English writer says: "If we buy a bushel of wheat at Bridgend, we get 168 pounds; at Darlington, 73½; at Worcester, 62; at Monmouth, 80; at Shrewsbury, 75; at Wolverhampton, 72; at Manchester, 60 or 70, according to whether we are dealing in English or American wheat; at Newcastle, 63; at Cærmarthen, 64."

A German measure, the *scheffel*, varies thus: in Bremen it is a trifle over two bushels; in Brunswick a little over eight and a half bushels; in Hamburg somewhat less than three; in Hesse Cassel two and a fifth; in Prussia one and a half; in Leipsic two and eight-tenths; in Wurtemberg four and nine-tenths. Other weights and measures also present great differences.

Our differences hitherto have been more in the way of enactments constituting different weights to be the equivalent of the bushel, but the *system* in use, is *in itself, complicated, arbitrary and destitute of order, harmony and useful relations among its parts*. Nothing keeps it in use except the fact that we have been taught and are accustomed to it.

The advantages of the Metric System over the one in common use are much greater than those of our decimal currency over the old one of pounds, shillings and pence; and when once the

simple, orderly, harmonious, decimal system of weights and measures is fairly in use, it will be matter of astonishment how an intelligent, progressive people ever came to endure so long such needless inconveniences. The fact is, that the Yankee nation is rather behind the age in this matter. The committee of Congress in their report say, "the simple order, beauty and convenience of the metric system have so commended it to universal acceptance that it has already been adopted exclusively or permissively by nearly all the nations of Christendom." Nearly all learned societies in this country and in Europe have advocated its adoption; it has worked its way into nearly all scientific books and periodicals, and its progress is urged forward by the combined intelligence of the civilized world.

The hindrances in the way of its exclusive adoption are not many nor great, but they require time to be overcome. The greatest, by far, is the difficulty of *unlearning* and *disusing* what we learned in childhood and are accustomed to. We all remember how gradually the decimal currency took the place of a worse one, and how many, past middle age or of a particularly conservative turn, scarcely relinquished the old way while they lived. Another is the sacrifice of the value in the measures and scales now on hand. This, however, may be less than would be supposed at first. Platform scales would require only new beams and peas. Manufacturers of the more popular sorts, such as Howe's and Fairbanks' already make them for the metric system, and would doubtless soon offer new beams and peas at a moderate price to replace the old ones. Ordinary balances would only require new weights.

To learn the new system is not a difficult matter. It may be mastered and fully learned in an hour by almost any one, and many a boy in his teens would do it in half the time.

The first thing to be done is to learn the names and meanings of the four units:

Meter, the unit of length; (which is also the *fundamental* unit of the whole system, all the others being derived from it.)

Liter, the unit of capacity.

Gram, the unit of weight.

Are, the unit of surface.

Then it is necessary to learn four Greek numerals used for *multiples*, as follows:

Deka	10
Hecto	100
Kilo	1,000
Myria	10,000

Then three Latin numerals used for prefixes, to indicate *subdivisions* of the units. These are :

Deci	1-10th
Centi	1-100th
Milli	1-1,000th

It is a decimal system. There is a measure ten times the length of the meter, which is called the Dekameter; another, a hundred times the length, called a Hectometer; another, a thousand meters in length, called a Kilometer; and one 10,000 meters long, called a Myriameter. Then, to divide the meter, we have the Decimeter, which is one-tenth as long as a meter; the Centimeter, the one-hundredth of the meter; and the Millimeter, which is the one-thousandth of the meter. So with the other measures and weights; the same prefixes are used (so far as needful) to all the units; the Greek for multiples, and the Latin for the fractions or subdivisions. Altogether we need to learn eleven words and their meaning, and the whole system is mastered. It is well that all the terms be fully understood and perfectly familiar, although, in practice, it is found that not all come equally into common use. In this respect it is much as with our decimal currency. If we speak of the sum represented by the figures \$65.43, we are apt to say, sixty-five dollars and forty-three cents, rather than six eagles, five dollars, four dimes, and three cents; and so in the metric system, some of the terms come into more frequent use than others.

As above remarked, the *meter* is the fundamental unit. This word is derived from the Greek word "metron," signifying measure. The meter is a measure of length, being a ten-millionth part of the distance from the equator to the pole, and is about thirty-nine and three-eighths inches—or, to give it more exactly, with a decimal of inconvenient length, 39.37079 inches. From the meter all the other measures and the weights are derived. Thus the unit of area or surface measure is called the *are*. This is the square of a dekameter—and of course equal to one hundred square meters—or about one hundred and nineteen and a half square yards. A surface of one hundred ares is called a hectare,

(which is the square of a hectometer,) about two and a half acres, (or more exactly, 2.471 acres.)

The one hundredth part of an are is called a centare, equal to one square meter, (or 1550 square inches.)

For measures of capacity, the *liter* is the unit. The liter is equal to the contents of a cube the edge of which is one-tenth of a meter. It is a little more than our wine quart, and less than our dry quart. One hundred liters constitute a hectoliter, (equivalent to one-tenth of a cubic meter,) and not far from 26½ gallons. The tenth of a liter, called a deciliter, is a trifle less than our gill of wine measure.

In weight, the unit is the *gram*. The gram is the weight of a cube of water, (at its greatest density,) each edge of which measures the one-hundredth of a meter. It is equivalent to nearly fifteen and a half grains (or more exactly 15.432 grains). One thousand grams constitute a kilogram, (about two and one-fifth pounds,) a denomination much used. A thousand kilograms make a millier, (twenty-two hundred and four and six-tenths pounds,) not very far from our old-fashioned "long ton" or "gross ton." The subdivisions of the gram, as the centigram and milligram, are already almost exclusively used by scientific men in all countries in such chemical and other researches as require delicacy and accuracy.

The State of Maine was one of the earliest to recommend Congressional action in this matter, as will appear from the following preamble and resolve passed by the Legislature:—

Whereas, there now exist throughout the civilized world incongruous and inconvenient systems of weights, measures and currencies, without a proper basis or any uniform ratio of divisions and multiples, thus subjecting the scholar, the teacher and the man of business to numerous and needless perplexities in computation and in trade, and making it a most difficult task to determine the absolute or the comparative value of many coins, quantities and admeasurements now in use; and whereas, a reform in regard to these inequalities and irregularities is demanded by the highest interests of education and commerce, therefore,

Resolved, That our Senators and Representatives in Congress be requested to use their influence to have that body consider the proposed subject, and establish a uniform decimal system of weights, measures, and currencies, fixing their standards or units

of each measure, with their subdivisions and multiples, in the most concise and simple manner; and that the more effectually to promote this desirable reform, an international commission be recommended for the purpose of producing an uniform system of metrology throughout the commercial world.

It is hoped, therefore, that the people of Maine will not, at the least, be more backward than others to familiarize themselves with the system, and that we and our children may enjoy its benefits at a comparatively early day.

A BILL to authorize the use of the metric system of weights and measures.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act, it shall be lawful throughout the United States of America to employ the weights and measures of the metric system, and no contract, or dealing, or pleading in any court, shall be deemed invalid, or liable to objection, because the weights or measures expressed or referred to therein are weights or measures of the metric system.

SEC. 2. *And be it further enacted,* That the tables in the schedule hereto annexed shall be recognized, in the construction of contracts, and in all legal proceedings, as establishing, in terms of the weights and measures now in use in the United States, the equivalents of the weights and measures expressed therein in terms of the metric system; and said tables may be lawfully used for computing, determining, and expressing in customary weights and measures the weights and measures of the metric system.

Measures of length.

METRIC DENOMINATIONS AND VALUES.		EQUIVALENTS IN DENOMINATIONS IN USE.
Myriameter	10,000 meters	6.2137 miles.
Kilometer	1,000 meters	0.62137 mile, or 3,280 feet and 10 inches.
Hectometer	100 meters	328 feet and one inch.
Dekameter	10 meters	39.37 inches.
Meter	1 meter	39.37 inches.
Decimeter	1-10th of a meter	3.937 inches.
Centimeter	1-100th of a meter	0.3937 inch.
Millimeter	1-1000th of a meter	0.0394 inch.

Measures of surface.

METRIC DENOMINATIONS AND VALUES.		EQUIVALENTS IN DENOMINATIONS IN USE.
Hectare	10,000 square meters	2.471 acres.
Are	100 square meters	119.6 square yards.
Centare	1 square meter	1,550 square inches.

Measures of capacity.

METRIC DENOMINATIONS AND VALUES.			EQUIVALENTS IN DENOMINATIONS IN USE.	
Names.	No. of liters.	Cubic measure.	Dry measure.	Liquid or wine measure.
Kiloliter or stere	1000	1 cubic meter	1.308 cubic yards	264.17 gallons.
Hectoliter	100	1-10 of a cubic meter	2 bus. & 3.35 pecks	26.417 gallons.
Dekaliter	10	10 cubic decimeters	9.08 quarts	2.6417 gallons.
Liter	1	1 cubic decimeter	0.908 quart	1.0567 quarts.
Deciliter	1-10	1-10 of a cubic decimeter	6.1022 cubic inches	0.845 gill.
Centiliter	1-100	10 cubic centimeters	0.6102 cubic inch	0.338 fluid ounce.
Milliliter	1-1000	1 cubic centimeter	0.061 cubic inch	0.27 fluid drachm.

Weights.

METRIC DENOMINATIONS AND VALUES.			EQUIVALENTS IN DENOMINATIONS IN USE.
Names.	Number of grams.	Weight of what quantity of water at maximum density.	Avoirdupois weight.
Millier or tonneau	1000000	1 cubic meter	2204.6 pounds.
Quintal	100000	1 hectoliter	220.46 pounds.
Myriagram	10000	10 liters	22.046 pounds.
Kilogram or kilo	1000	1 liter	2.2046 pounds.
Hectogram	100	1 deciliter	3.5274 ounces.
Dekagram	10	10 cubic centimeters	0.3527 ounce.
Gram	1	1 cubic centimeter	15.432 grains.
Decigram	1-10	1-10 of a cubic centimeter	1.5432 grains.
Centigram	1-100	10 cubic millimeters	0.1543 grain.
Milligram	1-1000	1 cubic millimeter	0.0154 grain.

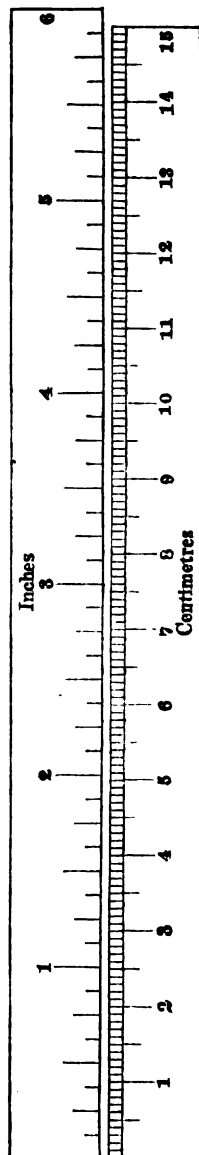
JOINT RESOLUTION to enable the Secretary of the Treasury to furnish to each State one set of the standard weights and measures of the metric system.

Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he is hereby, authorized and directed to furnish to each State, to be delivered to the governor thereof, one set of the standard weights and measures of the metric system, for the use of the States respectively.

Scheme of the weights and measures of the metric system.

Ratios.	Lengths.	Surfaces.	Volumes	Weights.
1000000 100000 10000 1000 100 10 1 1-10 1-100 1-1000	Myriameter. Kilometer. Hectometer. Dekameter. Meter. Decimeter. Centimeter. Millimeter.	Hectare. ARE. Centare.	Kiloliter, or stere. Hectoliter. Dekaliter. LITER. Deciliter. Centiliter. Milliliter.	Millier, or tonneau. Quintal. Myriagram. Kilogram, or kilo. Hectogram. Dekagram. GRAM. Decigram. Centigram. Milligram.

Scale representing a portion of the meter divided into centimeters and millimeters, together with a six-inch scale divided into eighths of an inch; one inch contains 25.4 millimeters.



JERUSALEM ARTICHOKE.

(Helianthus Tuberosus.)

Is it not possible that this tuber has fallen into unmerited neglect as an agricultural product?

On many farms in Maine it has been grown, or rather has been suffered to grow, to a limited extent, but in no case has it come to my knowledge that it has received treatment deserving the name of cultivation. Being unable therefore to collect data in relation to its worth or worthlessness from any facts of experience among us, I propose to gather and quote from various authorities what are asserted to be facts, with regard to the composition of its tubers, its productiveness, value as food for animals, and other related matters.

In the first place, it may be remarked that the common name is not accurately descriptive of the plant. One might suppose it to be a kind of artichoke which originated near Jerusalem, or was first disseminated from thence, whereas it is not an artichoke at all,* but a sunflower; and "Jerusalem" is only a corruption of the Italian "Girasole," which signifies sunflower. It somehow came to be called artichoke from a supposed resemblance in taste when cooked to the plant properly so named.

Like all the sunflowers it is a native of America, and this, although said to be indigenous to the warm climate of Brazil,† is capable of withstanding the utmost severity of a northern winter—the leaves and stems only perishing at the approach of frost.

* The proper Artichoke, or Globe Artichoke as it is usually called, *Cynara Scolymus*, is nearly related to the thistle family, and has a dense, close head, or fleshy receptacle, on which the flowers are based. These heads are boiled and constitute a very delicate dish. It is propagated by suckers or offshoots from old plants; the preparation of soil being much like that for asparagus.

† Boussingault remarks: "This plant is generally believed to be a native of South America, but Humboldt never met with it there, and according to M. Correa it does not exist in Brazil. The property which the tubers have of resisting the cold of our winters, and several botanico-geographical considerations, lead M. Brogniart to presume that the plant belongs to the more northern parts of Mexico."

In this respect it differs widely from the potato and yam, both natives of the same hot climate.

It was introduced into Europe about the same time as the potato, and for a long time it seemed doubtful which would gain the preference for cultivation; more than one old writer roundly asserting its decided superiority over the latter. Prof. Low, of Edinburgh, says of it, "This plant produces stems from 5 to 10 feet in height. It is propagated with the greatest ease from tubers, like the potato. It grows rapidly, and may be cultivated like the potato, but the intervals between the rows should be larger. The tubers are in clusters attached to the roots of the plant. As compared with the tubers of the potato they are watery, and may be believed to be inferior in nutritive properties. But the quantity is frequently very large; about 500 bushels per acre, it is said, having been produced without manure. The tubers do not seem to have great fattening properties, but they are eagerly eaten by animals. Taking into account the hardy qualities of the plant, its productiveness, and easy culture, it may be doubted whether it deserves the universal neglect into which it has fallen. Granting its inferiority as an article of food to other plants now cultivated for our domestic stock, it must be of some importance to have a plant that can be so easily raised, and on soils so low in the scale of fertility."

A writer in the Penny Cyclopædia says, "The tubers when cooked form a good substitute for potatoes, and are by some preferred. Many animals eat them with avidity, and they are especially recommended for sheep."

John Wilson, in his "British Farming," says, "This root, although decidedly inferior to the potato in flavor, is yet deserving of cultivation. It grows freely in inferior soils, is easily propagated and requires little attention in its cultivation. When once established in the soil it will produce abundant crops for successive years in the same spot. It is sometimes planted in woods to yield shelter for game, for which purpose it is admirably fitted, as it grows freely under the shade of trees and yields both food and covert. In properly fenced woods it might yield abundant and suitable food for hogs, which might there root it at their pleasure without damage to anything. Where they had mast along with these juicy tubers, they would undoubtedly thrive apace. After they had grubbed up what they could get, enough would be left

to reproduce a crop for successive seasons. Such a use of this esculent seems well deserving of careful trial."

In France, and yet more in Germany, this plant has been and still is cultivated to a much greater extent than it has ever been in England or Scotland, and is esteemed as a valuable crop, and a desirable food for animals. This estimation is based not only on theoretical data obtained from its analysis, but upon practical demonstrations in feeding experiments.

Boussingault, who seems to have given careful attention to the subject, says, "It is propagated by the tubers which it produces, and which are regarded for good reasons as most excellent food for cattle. In times when the potato was not very extensively known, it also entered pretty largely into the food of man; when boiled its taste brings to mind that of the artichoke, whence its name. * *

"There are few plants more hardy and so little nice about soil as the Jerusalem Artichoke; it succeeds everywhere with the single condition that the ground be not too wet. The tubers are planted exactly like those of the potato and nearly at the same time; but this is a process that is performed but rarely, inasmuch as the cultivation of the helianthus is incessant, being carried on for many years in the same piece; and after the harvest, in spite of every disposition to take up all the tubers, enough constantly escape detection to stock the land for the following year, so that the surface appears literally covered with the young plants on the return of spring, and it is necessary to thin them by hoeing. The impossibility of taking away the whole of the tubers, and their power of resisting the hardest frosts of winter, is an obstacle, almost insurmountable, to the introduction of this plant as one element in a regular rotation. Experience more and more confirms the propriety of setting aside a piece of land for the growth of this productive and very valuable vegetable root.

"Of all the plants that engage the husbandman the Jerusalem Artichoke is that which produces the most at the least expense of manure and of manual labor. Kade states that a square patch of Jerusalem Artichokes in a garden was still in full productive vigor at the end of 33 years, throwing out stems 7 to 10 feet in height, although for a long time the plant had neither received any care nor any manure.

"I could quote many examples of the great reproductive powers of the helianthus; I can affirm, nevertheless, that in order to obtain

abundant crops, it is necessary to afford a little manure. I shall show in another chapter, however, that this is manure well bestowed.

"Like all vegetables having numerous and large leaves the helianthus requires light and air; it ought therefore to be properly spaced. The original planting of course takes place in lines, but in the succeeding crops and those which are derived from small tubers accidentally left in the ground, the order is, of course, lost; it is only necessary to destroy a sufficient number of the young sprouts which show themselves in the spring to leave those plants which are preserved with a sufficient space between them. When the plants are somewhat advanced the ground should be dug with the spade, and hoed to destroy weeds.

"The tubers are gathered as they are wanted; for, not dreading the frost, they may remain in the ground the whole winter. They do not require, like the potato, to be collected and pitted at a certain period; they require no particular situation, no particular care for their preservation. During winter the stems die and dry up; they may be burned or a better use is put them in the hogstye where the pith will absorb a large quantity of liquid manure. The average quantity of dry leaves and stems has been estimated at three tons per acre. The following quantities of tubers have actually been gathered in Alsace on one acre:

	Tons.	Cwts.	Qrs.	Lbs.
"Sandy soils,	4	8	3	6
Soils of the best quality,	10	8	3	13
At Bechelbronn (mean),	10	16	0	8
Bechelbronn, crops of 1839-40,	14	8	2	27 "

Space would fail, nor is it needful to present here the details of the experiments instituted and carried out by M. Boussingault to ascertain its comparative value as cattle food. His results may be briefly stated as follows—100 pounds of good hay were found to be equivalent to

280	pounds	potatoes.
280	"	Jerusalem artichokes.
400	"	mangold.
400	"	carrots.
400	"	turnips.

The equivalent amount of artichokes was given in these trials in place of other articles named, for terms of from 11 to 16 days, and

at the end, the weight of the animals was found to be the same, or with a trifling gain, as at the beginning, the usual work also having been performed.

According to Mr. Flint's remarks* in his report of the operations in connexion with the agricultural school at Hohenheim in 1863, it would appear that the comparative estimate in which roots and hay are now held varies somewhat from the estimate of Bous-singault. He says, "The winter fodder statement shows that 100 pounds of hay are equal in nutritive value to 275 pounds of beets, carrots and artichokes; to 200 pounds of straw, rape husks and potatoes; to 160 pounds chaff, to 125 pounds beer malt, to 60 oats; to 50 pounds crushed grain and oil cake." In his account of the institution at Grignon in France,† Mr. Flint says, "The artichoke served as a transition crop to improve poor calcareous soils, which it occupied for several years without receiving any manure. It has since been cultivated in the same conditions as other crops. It yields from 22,500 to 31,500 pounds of roots, on an average, per acre, and 2700 pounds of stalks which when cut are mixed with the residue of the distillery and fed to cattle."

Composition of the Tuber.—Old John Mortimer, in the Country-man's Kalendar, 1707, speaking of the potato, (which, by the way, can hardly be considered a field crop before A. D. 1750,) says: "The root is very near the nature of the Jerusalem Artichoke, but not so good or wholesome."

Whether better or worse, there is a marked contrast in the proportions of their most important proximate constituents, and one which readily accounts for their different appearance when cooked, one being wet and jellyish, the other dry and mealy. The mean of various analyses of the potato, show the proportion of starch contained in it to be near 15 per cent., and of sugar 3 per cent. While, according to M. Braconnot, in the artichoke there is 14.8 per cent. of (uncrystallizable) sugar and 3 per cent. of starch, or more properly of inuline.‡

* Report Mass. Board of Agriculture, 1863, p. 187.

† Same, p. 227.

‡ The roots of many plants, among which are those of the dahlia, elecampane, colchicum, dandelion and chicory, contain a variety of starch to which the name of inuline has been given. It is a white tasteless powder sparingly soluble in cold water but readily so in boiling water, from which, unlike common starch, it is deposited again on cooling in pulverulent form. Like common starch it is readily converted into dextrine and grape sugar by being boiled with very dilute acids.

So far as we can judge of the feeding value of these two sorts without actual proof by feeding, there would seem to be very little choice between them.

Dr. Salisbury of New York, some years since made analyses of two varieties, the white and red, the latter being the smaller and richer of the two, and remarks, "The artichoke contains much less starch than the potato, but is richer in sugar, dextrine, albumen and casein. Its power for fattening, perhaps, would not equal that of the potato, but in muscle-forming products, or nitrogen bodies, its composition would place it quite equal to that of the potato. The analysis shows it to be even richer."

When, however, we come to examine the results of an ultimate analysis of the tuber of the helianthus, we find another difference, which, as I conceive, gives to it, in one aspect at least, a value beyond that of any other vegetable root usually fed to domestic animals. It is this: the root is found to be richer than others in the most valuable mineral constituents, phosphoric acid and potash—and as these would not be all appropriated by the animals feeding on the roots, so much as was not thus appropriated would be embraced in the excrements and consequently add greatly to the value of the manure—to the means of fertilization and increase of other crops.

Analysis of the ash of the tuber of the artichoke shows it to contain as follows:

Silica,	1.52
Phosphoric acid,	16.99
Sulphuric acid,	3.77
Carbonic acid,	11.80
Lime,	8.34
Magnesia,	1.30
Peroxide of iron,	0.45
Potash,	55.89
Chloride of potassium,	4.88
	<hr/>
	94.94

Prof. Way says, "The mineral composition of the tuber of the Jerusalem Artichoke may be thus expressed—

Mineral matter (in pounds) in one ton of the tubers:

Silica,	0.61
Phosphoric acid,	6.81
Sulphuric acid,	1.51

Lime,	1.34
Magnesia,	0.52
Peroxide of iron,	0.18
Potash,	22.40
Chloride of potassium,	1.96
	<hr/>
	35.33

Here it will be seen that, weight for weight, this vegetable contains nearly four times as much phosphoric acid, and three times as much alkali as turnips, beets or carrots. Taking into consideration the large produce of this plant, and the little manure or cultivation required by it, we are at a loss to see where it obtains alkaline phosphate, *unless it is possessed of superior powers of acquiring mineral sustenance.*"

The above statements, it is believed, are all from good authorities, and may be relied upon as substantially correct. A brief recapitulation gives us the following facts:

1. The *Helianthus tuberosus* or Jerusalem artichoke will grow on almost any soil, no matter if it be poor, if it be not also too wet.

2. It will produce fair crops without manure and with little cultivation.

3. In nutritive qualities, for feeding to domestic animals, it compares favorably with the vegetable roots in common use.

4. After one crop is obtained, no further seeding of the land is required, and no cultivation beyond horse-hoeing between the rows—for thinning and weeding.

5. The tubers may be harvested in the fall, *or not*;—may be left in the ground without injury till spring.

6. It seems to possess the power of obtaining from the soil *an amount of the most valuable mineral constituents greater than any other root, and, consequently, by the manure it will furnish we can enrich in a corresponding degree other portions of the farm.*

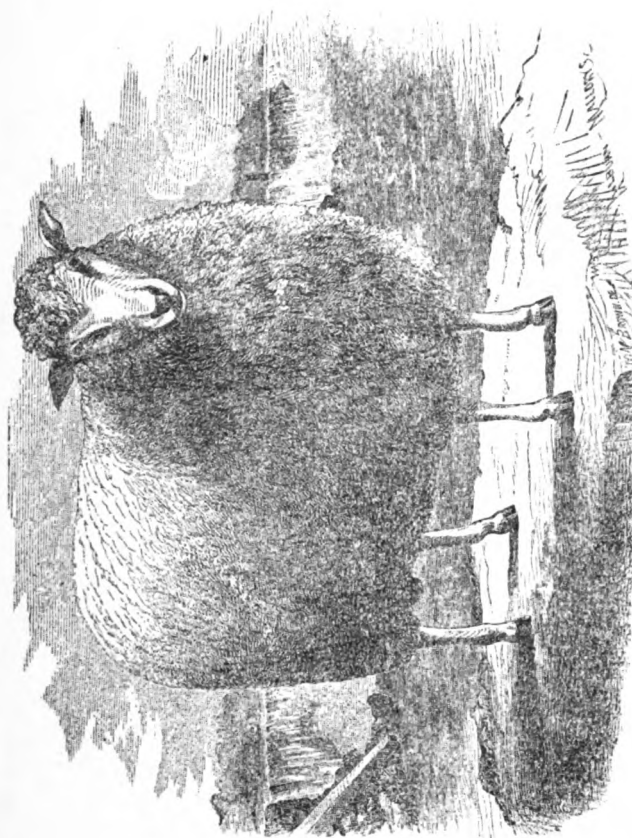
Now, then, if we have fair promise that, by appropriating to this vegetable a piece of poor land, part of a run out mowing field for instance, which now hardly pays for swinging a scythe or running a mower, with no expenditure of manure and little of labor, we can secure a respectable crop of roots which will help to nourish our stock, help furnish succulent food in winter and spring, and help manure the farm, it would seem worth a fair trial.

Let me suggest, if any one does try it, or if they do not, that, as a large portion of the potash and phosphoric acid contained in

food passes off in the urine, means should be used for their absorption and retention, and that the manure should be never allowed to lose its richest portions by needless washing and leaching.

I find very little regarding the culture of this root in any American agricultural periodicals. In one place it is said that Mr. Thomas Noble of Massillon, Ohio, planted the tubers in drills $2\frac{1}{2}$ to 3 feet apart, using a little more seed than for potatoes;—result, 1500 bushels per acre. A Mr. Smith of Erie county in the same State, recommends them for stock, and says “it yields from 800 to 1500 bushels per acre; the latter being grown on the best sandy loam and cultivated in the best manner.”

Dr. Holmes once remarked of it: “In regard to a substitute for the potato as a cattle and pig feed, we have long had a favorable opinion of the common Jerusalem artichoke, as it is called. It does not contain so much farinaceous matter as a good potato. If roasted it will not ‘crack open so mealy’ as a first rate potato will, but otherwise its ingredients are very much like the potato, and we think it vastly better than soggy, half-diseased potatoes. The tubers will soon obtain complete possession of the ground where they are planted, and if planted on a piece of waste ground not needed for other purposes, become valuable on this account.”



COTSWOLD BUCK NIAGARA.

The property of Elijah Wadsworth, Livermore Falls, Me. This buck was imported October, 1863, from the flock of F. W. Stone, "Moreton Lodge," Guelph, Canada West. The sire of "Niagara" won the first prize at the great "Provincial Exhibition" held in Toronto, Canada West, September, 1862, as the best yearling "Cotswold" buck, and the first prize at the county of Wellington Agricultural Society's Show, held at Guelph, in October of the same year. At the free "Exhibition of Specimens of the Different Breeds of Sheep," held at Boston, Mass., in April, 1864, being then but one year old, he received much attention, and fully sustained the character of the "Cotswolds" in comparison with other breeds. Exhibited at the "Essex Agricultural Society's Show," held at Lawrence, Mass., in September of the same year, he won the premium offered by the Society for the best buck, over strong competition.

O

ON PLOWING AND MANURING IN AUTUMN.

BY PHINEHAS BARNES, ESQ., OF PORTLAND.

[The following paper is the substance of an address delivered before the Cumberland County Agricultural Society, at Gorham, October 5th, 1865, and before the Aroostook Agricultural Society, at Houlton, Sept. 27, 1866.]

The complaint of "short seasons" for agriculture, in this latitude is so common, and apparently so well founded, that every considerate person among us, whatever his own pursuit, is likely to have some sympathy with those, who are primarily affected by this difficulty. Reflecting much and often upon this hardship, which besets our New England farm-life, the writer has been led to think out, and now ventures to bring forward, a method of cultivation, which tends materially to prolong our season for the growth of useful crops, and to heighten the effect of all the agencies of production, during the whole period between seed-time and harvest. And it may awaken a specific interest in what is proposed, to declare beforehand, that the method recommended, is revolutionary in its character, whether its effect be more or less complete.

The question concerns the production of those annual plants, which furnish food for man, and for the domestic animals. By the very statement of the complaint about short seasons, we divide the year into two parts—that part of the year in which food-plants grow—and that part of the year in which they do *not* grow.

With respect to nearly all our annual crops, the period of non-growth is much the longer of the two parts of the year. No doctrine or theory can alter this established climatic fact. Our business is to make the most that is possible, of that shorter period, which is all we can have, between the shooting of the germ and the gathering of the harvest. If then, by any faulty practice, we lose any part of this briefer period of growth, if, for instance, when the seed ought to be sprouting in the ground, we have not yet prepared

the ground to receive the seed—this loss is irrecoverable. The sun does not wait for us, either in spring or in autumn. He fulfils his course, whether we are ready or not.

In what is called a "wet spring," so often the experience of New England life, our complaints almost assume the form—not that the sun is hastening too fast towards the summer—but that he delays and hides his genial influence. It is not merely that the seed cannot be put into the ground, but the common expression is, "We cannot get on to the land with a plough." This expression admits, that in the late wet spring, at the very time, when we would be glad to have the seed in its bed, the bed is still unprepared for it, and we must wait, and wait, for the rains to pass away, before a furrow can be turned. And when the clouds are gone, how many of the long sunny days of May are lost, before the land can be dried and ploughed, and harrowed and manured, so that the seed can be cast into the earth, and the plant commence its too short period of growth?

An illustrative lesson—though from the nature of the case, not a conclusive analogy—may be obtained from observation of the perennial plants, under the influence of spring. These do not wait for cloudless skies. The mild temperature of spring pushes them forward, whether it rains or not. In fact, they rejoice in spring rains. Who has not observed the flashing green of a well-dressed grass field in early spring! Who does not wonder at the vine, bursting with vitality at every joint! What farmer has not seen, with vexation, the rampant perennial weeds starting up with mischievous activity, long before he is ready to put a useful seed into the ground? One difference is, that these plants are ready beforehand. When spring comes, they are prepared for it; they begin to grow, precisely at the moment, when their growing season begins; they lose no time. Their lesson to us, is, that by every practical contrivance, and by all wise forecast, we should so adjust the conditions of the life of our annual food-plants, that they also shall begin to grow, at the earliest moment when the influences of spring are suited to their capacities, and lose not a day, nor an hour.

Considering, therefore, that under the ordinary New England practice, and for our usual crops, the preparation of the land to receive the seed takes place in spring, that the farmer must wait, sometimes many days, for the late spring rains to be over and the surface of the ground to be dried, before a plough or a cart can be

moved, and then, that other days of warm and genial sunshine must be expended in plowing, and manuring, and harrowing, too hastily and inefficiently perhaps, before a seed can be dropped,—the revolutionary change now proposed is, to turn our method of cultivation right about—end for end—to prepare in the autumn the seed-bed into which the seed is to be cast in the spring, and to deposit in the earth, in the fall beforehand, the fertilizers, which are to nourish the next year's crops. So, nothing will remain to be done in spring, but to drop the seed and cover it, at the first moment when the earth is warm enough to quicken its germ.

Of course, it is not a thing unheard of, to plough and manure the land in autumn. Something of the kind is done on every well managed farm. But the proposition now urged is, to adopt this method of cultivation as the general and customary rule for all crops, that are raised under the plough—not merely to break up sward land in the late summer or early fall, but to plough, in the fall, the stubble lands also, which are to be planted or sowed in the following spring;—not merely to spread some top dressing in autumn, but to carry out and put *into* the ground all the fertilizers intended for next year's plants, and to put this dressing, (if the supply is not enough for broad cast application,) into the very furrows and drills, where the seed is to be dropped at seed-time—the exceptional cases to this general practice being left to arise, only as required by special exceptional causes.

Such being the statement of the case, the following considerations are submitted, in explanation and advocacy of the method proposed.

The two processes of cultivation, which precede the act of planting or sowing, are, the preparation of the seed-bed, and the preparation and deposit of the plant-food, in the place where the plant is to grow.

What is the preparation of the seed-bed? By the action of the plough and the harrow, we undertake to break up the hardened surface of the earth, to crush and grind its clods, to pulverize its whole mass, so as to open it to the penetration of air and heat, so as to expose its comminuted particles to the dissolving influences of rain, so as to enable the roots and rootlets of the expected plants to push their way freely, in all directions, in search of the food, on which they are to live, whether it be the mineral food naturally pervading this pulverized soil, or the organic fertilizers to be furnished by art.

What do we mean—what should we mean—by the preparation and furnishing of plant-food? Confining the inquiry to the common fertilizer used on New England farms, is it a proper preparation of food for the young plant to put crude and green stable manure into the furrows and hills, at the same time that we drop the seed, so that the tender rootlets in a few days will be in direct contact with this rank and undissolved mass? Our highest authorities declare that young plants are actually poisoned by green manure. Is it not, on the contrary, the indication of common sense, that manure will be most effective when it is mixed with and distributed through the pulverized material of the seed-bed, as it is also the rule of the most familiar science, that no manure is useful, until it is dissolved?

In fact, we may almost say, that the whole object of these two primary steps in cultivation is, to put things into that condition, which shall effect at the right time the most complete dissolving and distribution of the fertilizers, which are to nourish the growth of plants.

We might endeavor to reach this object by costly and laborious contrivances of art. Liebig declares in one of his latest books, that ploughing should be so thoroughly done, and so many times repeated, that no harrowing will be needed, and the harrow will be a superfluous implement. The English use "clod-crushers" and other ponderous and expensive machines, to effect the complete pulverization of stiff soils. So with the problem of liquid manure. There are the minute and repulsive processes of Japanese and Chinese farming, and the expensive apparatus, by which the English cultivator, Huxtable, distributes fertilizers in this form, through iron pipes and hose. But these elaborate arrangements are all beyond the resources of New England farmers, and some of them, in fact, degrade the laborer, while exalting the art of cultivation.

But it is to be seen, whether nature will not help us, and whether natural agencies will not enable us to emulate the achievements of art, if we will only act in harmony with those simple and unexpensive laws by, which all natural forces are exerted. Our year is divided into the two periods, when plants grow, and when they do not grow. Is the non-growing period all a dead and useless blank? The later months of autumn, the winter, and the early months of spring, are these a mere barrier and hindrance in the farmer's way? When the farmer has cleared

the ripened crops from his fields, does nature then go to sleep, and utterly refuse him all help, between harvest and seed-time?

What are the phenomena, in fact? What would be the application and influence of the forces of nature at that period, if we had all things in readiness to receive their effects?

Suppose the land ploughed before the last of October, and left, it may be, in stiff furrows and rough clods—the fall rains, descending upon it for weeks afterwards, have the effect of softening, soaking, drenching, dissolving these hard masses, carrying into the open ground also, all the air fertilizers, which the rain sweeps from the atmosphere. Nor is any harm done, if the interstices between the clods are filled with water. Following the autumn rains come the irresistible energies of frost and ice, breaking and tearing asunder whatever lumps of earth the rains have not dissolved, and actually lifting up the soil, which the rains have tended to settle and depress. Add now the supposition, that the manure for next year's crop had been put *into* this ploughed land before the fall rains began, whether turned under from a broadcast spread, or placed in the actual, carefully made furrows and drills, where the plants are to grow. The same drenching rains of autumn, the same energies of winter's frost, will dissolve and distribute this manure with triumphant effect. The spring rains complete the result, both for the ground and the manure. The dissolving ice melts the clods, if any are left, melts the manure, if any is not yet subdued. There is no resisting these forces. Water is nature's universal solvent. In milder latitudes, they know it only in its liquid conditions. But in our agriculture, we may have its freezing and melting forces, besides.

For crop lands, thus ploughed and manured in autumn, what fears need there be of a wet spring? The late spring rains, under the growing warmth of the ascending sun, are only completing the preparation for the seed. No anxious waiting to get on to the land with the plough, no dragging of heavy dung carts over the soft furrows. As soon as the rains are over, as soon as the sun has dried the surface of the earth, the genial bed is ready for the seed, and—what is more—at the first moment, when the smallest rootlets of the young plants open their mouths for food, the food is there, and in the exact condition in which nature requires it to be.

It will not fail to be observed, that if the necessities of the farmer require him to use coarse manure, much mixed with straw, this material will have an excellent mechanical tendency to keep

the soil light and porous, while its soluble parts are under the full action of rain and frost.

So, also, it is evident, that if the farmer judges that any particular piece of ploughed land (manured broadcast) has become too much settled and stiffened under the influence of winter, the single ploughing or harrowing that may be required in spring to lighten it and loosen it again, will be a labor so easy and rapid, that the business of planting and sowing will scarcely be delayed a single day.

The obvious objection to this method of cultivation is, that in the fall there is no stock of manure on the farm. The manure is made in the winter, and therefore it must be applied in the spring.

If this objection states a difficulty, on the point of time for applying manure, it admits a greater difficulty, on the point of the fitness of the material. In the spring, the manure made the winter before, is still a crude, undissolved mass. It cannot become perfect plant-food until it has been reduced, mixed and dissolved. How long a time this may require will depend upon the season. If an early drought follows, after planting fields manured in spring, nothing can be more disheartening. We talk as though the plants themselves needed rain. In fact, it is the manure which requires water, so that it may be dissolved, and become fit to nourish the plant.

But the answer to the objection is equally obvious, if there is any soundness in the theory now under discussion. The theory, in fact, states the answer. We must revolutionize our methods. The farmer who has means, must buy one year's stock of manure, in advance, resorting, if necessary, for that first year, to the artificial fertilizers. He will turn his methods, end for end, at once. The farmer who has not means to purchase, must effect it gradually, by cropping a little less land for a time, by special contrivances and diligence in making manure, by scraping the roadsides, by more careful composting, and in whatever possible way, he must gain and save, at first, a fifth part, or a quarter part, of a year's stock—applying that much to a just proportion of his ploughed land in the fall—the next year, another fifth or quarter, and so on—every year, no doubt, increasing his capacity to gain more and more, until within three or four years. he also will complete the circuit, and find his manure heap, in September, ample for all his next year's crops.

We must meet, of course, the question of the summer management of manure. How the heaps shall be formed, where they

shall be placed, how much composting shall be done, whether or not the piles shall be overhauled and repacked—these are details, which every farmer will manage according to his facilities and his skill. But the success of the method requires, at all events, that the stock of manure, thus kept over from April till September, shall be sheltered from the sun. Farmers who have manure sheds or cellars, are supplied with what the case requires. But vast numbers of farmers have neither of these facilities. And if necessity of any kind requires a farmer to pile his manure in the open barn-yard, it is a plain and unexpensive method, to cover the heap with simple, common earth, carefully placed and packed, on the sides and top. If it is thought advisable to shovel over the heap in the course of the summer, no harm will result from mixing this covering with the manure. The mixture and division, in fact, will improve the mass. Repacking the heap, cover it again with earth, till it is needed for use. The manure will all be there, and in good condition, when it is wanted.

The question of ploughing and manuring in the fall, involves, of course, the question whether there is time for these operations, at that season of the year.

If it were common, in this part of the world, to keep very large breadths of land under the plough, the thing could not well be done, with the limited laboring force of New England farms. But our tillage lands are comparatively narrow in area, and, in fact, when we come to this problem, as a practical reality, we may be surprised to find that there is more time and better time for this work, in autumn, than in spring. Count the days in spring, from the time when the New England farmer is first able to "get on to the land" with his plough, to the time when all his seed, except turnips, is in, or ought to be. Hardly more than a month in all! But from the middle of August, when the hay-harvest is everywhere ended, to the first of November, when the fall rains and frost are likely to stop work on ploughed lands, there are more than seventy days. It is true, there are the other crops to be gathered, after haying is over, and the wise farmer will need to order his time skilfully to accomplish, within the same period, the harvesting of this year's crops, and the preparation of the land for the next. But there are intervals and alternations, of which the good manager will always take advantage. The ripened grain and Indian corn must be attended to, precisely when the best weather permits. Ploughing and manuring for next year, must then give

place, for some days. The last of September finds these crops all out of the way. The harvesting of the root crops is far less pressing. These can wait, and take their convenient turns, while the proper share of time is given to ploughing and manuring. In fact, the harvesting of turnips, mangolds and carrots can be put off to the very last, without possible harm. If they are gathered before the ground is inconveniently wet with November rains, it is enough.

It is to be considered also, that the seventy days after the middle of August, are the driest season of the whole year, when the land is ordinarily in the best condition to be worked, and when the temperature is best fitted to the comfort and the activity of all the working force, both men and animals. The days are shorter, it is true, but they are the most enjoyable days of all the year, for open-air life. Compare the wet days of early spring labor, and the hot days that follow, with the dry and cool September and October—which has the advantage in the amount of farm labor that can be accomplished, week in and week out?

This is the proper place to state an exception to the rule of ploughing and manuring in autumn. It is, however, but a half-exception. Where roots are not taken off the land until the very last thing before heavy fall rains and frost, it would, usually, not be practicable to plough this land, the same fall. But the digging or pulling of the roots is almost equal to a ploughing, and, assuming that the roots may not have been so heavily manured, themselves, as to supply the wants of the succeeding crop—assuming, also, that the reserved stock of manure is ample—it is submitted that, in such a case, it is only necessary to wait until the top of the ground is frozen, and then to take advantage of good working days in November, or even in December, to haul out and spread the manure on the surface, leaving it there for the action of rains and frost, and that it would be found in the spring to be nearly as well dissolved and distributed, as if it had been actually worked into the soil, in the fall.

In fact, whenever, for any reason, it is not practicable to plough in autumn, the spreading of manure, after the ground is frozen, may be continued quite until the time when the snow is too deep for the convenient moving of the loads, thus really lengthening out the farmer's working season by several weeks. And in the southern parts of New England, this might often be done, through the whole winter, provided always, that the farmer by revolu-

tionizing his methods of cultivation, had the stock of manure to haul.

It is kindred to this part of the subject, to remark here upon certain general improvements upon farm-lands, of acknowledged importance, but which are commonly not undertaken, or insufficiently carried out, because, according to the common round of ploughing and manuring, the farmer is in no condition to enter upon such improvements, at the proper time.

For instance—subsoil ploughing. If we may credit the unanimous voice of all the books and all the approved theoretical authorities, there is no treatment of land, which is more important and valuable than this. But where is the farmer—where is any considerable number of farmers, in this part of the country—who can show us any experience in the use of the subsoil plough? The writer of this paper has been accustomed, for a long, time to look with interest at what is going on among the farmers, over a somewhat wide extent of this State—but, in all that time, he has never seen a subsoil plough in the State of Maine—neither upon a farm, nor at an agricultural show, nor even in an agricultural warehouse. The reason for the omission to use this implement is obvious enough. It is certain that the theoretical authorities on this subject are right, and it is equally certain that intelligent farmers know it to be so. But what time is there, in the spring of the year, for subsoil ploughing, in this latitude? It is more than can well be done, to plough and harrow and dress the top soil, in the fleeting days that hurry along between frost and seed time! And in what condition is the ground for subsoil ploughing at that time? Obviously, as unfavorable as could well be, too wet and sticky, altogether, as a general fact.

And although the best results of subsoil ploughing are only realized, where the ground is thoroughly underdrained, yet it is plain, that in the dry season, which ordinarily comes after the middle of August, all our good tillage lands would admit of the adoption of this treatment, and a large part of its useful results would be attained. If it were a common and settled habit to do all the ploughing of the year at this period, it can hardly be doubted, that enterprising and skilful men would put in practice the theory which they all believe, in respect to loosening the under-soil, so as to develop its virgin fertility, and find new stores of plant-food, which the generations of their predecessors have never yet touched. The subsoil plough would then have a chance to *prove* its usefulness, and would become a common implement.

Another general improvement—the top-dressing of grass lands. Most farmers would be glad to do more of this than is now commonly attempted, and, perhaps, the first difficulty in the way, is that the stock of manure is usually not enough, in quantity, to dress the plough-lands and the grass-lands, in the same year. But if there were sufficient, what farmer would haul heavy loads of manure over the soft sward of his grass fields, in April or May? It would be suicidal to attempt it. Unquestionably, the best time for surface manuring of grass lands is after the hay is cut. The ground is then dry and hard, and would suffer little or no injury from the pressure of wheels. But, according to the usual practice, there is then no manure to be hauled. The barn-yard is empty—the manure heaps are not there. No supply has been preserved. The practice has become so inveterate, of using, in the spring, the stock which has been made in the winter, that, even where the supply might be ample, great numbers of farmers put it all into the plough-lands in spring, as matter of course, and the grass fields are left to go hungry, till they are worn out. But if manuring were done in autumn, the obvious sense of giving a part of it to the grass lands, when it could be done easily and without laceration of the sward, would be much more likely to be carried out in practice. It might be ascertained with much more certainty than is now generally allowed, that it is easier and cheaper, and far more pleasant, to keep up the productiveness of mowing lands by liberal top-dressing, at the right time of the year, than it is to wear them out, and then go through with laborious and expensive processes of ploughing and cropping, for their restoration. But there will be no liberal top-dressing of grass-lands, as a settled habit, until there is a settled habit of having a good stock of manure on hand for this purpose, at the right time of the year. And that time is *not* the spring.

Since the argument of this paper thus advocates the application of manure upon the surface of the ground, there to be exposed to whatever atmospheric violence may prevail between November and May, not only upon sward land, but upon stubble also, in these cases, where there is not time to plough it in before frost, it is likely to encounter the objection, so commonly heard in such discussions, that, in this way, much of the virtue of the manure will be wasted by evaporation or wash.

Without attempting here to investigate fully such objection, and, laying out of view the case of tillage lands upon steep hill-

sides, which are exceptional merely from locality, the writer has the means of fortifying his positions by two interesting references to good authorities.

The first is from a very valuable article, by Judge French, on English Husbandry, contained in the Patent Office Report, for 1860, (p. 148,) in the following terms :

"Frequently the manure is spread and remains on the surface several weeks before it is ploughed in, exposed to the action of the atmosphere. This is one of the disputed points among agriculturists in America. The general notion has been, until quite recently, that such exposure of manure subjects it to great loss by the escape of ammonia and other volatile elements, and farmers have hastened to cover it by the plough as soon as possible. Of late, a different theory and practice has made progress, and it has been contended that this loss has been greatly overrated. In Lincolnshire and many other parts of England, the farmers prefer to spread even green manure several weeks on the surface. 'Theory,' say they, 'seems against us, for there must be some loss, and it is difficult to say how there can be any gain, but we know, from uniform experience for years, that we get better wheat crops by this practice.' Upon our suggestion to a very intelligent farmer that the powerful odor from his manure thus spread, indicated great waste, he replied, 'I admit there may be some loss, but I think less than is usually supposed. What we smell, is partly sulphuretted hydrogen, which is of no value, and partly ammonia, which is of great value to agriculturists. The quantity of ammonia thus lost, however, is not great, and might be purchased at any shop for a few shillings.' "

The second citation is from an article in the same volume of Patent Office Reports, (p. 118,) by Mr. Bright, the well known writer on fruit culture. It is there extracted from the *Gardener's Monthly* :

"The practice of top-dressing, or of surface manuring, has long been the favorite method employed by all intelligent gardeners within the circle of my acquaintance. We have long ago learned that masses of rich, nitrogenous manures are not what plants require about their roots, but that manures are applied much more successfully (and less injuriously) by top-dressing, either in solid or liquid form. Nature never manures her plants with crude masses of concentrated fertilizing substances, but imparts her stimulating and mineral food in a state of most minute subdivision—almost infinitesimal—chiefly from the surface of the earth. * * * * *

The great objection to surface manuring is founded upon the probable loss of ammonia, caused by the exposure of decaying manure, upon the surface of the earth. But this loss has been shown by sound reasoning, and by facts deduced from practical experience, to be much less than is commonly appre-

banded; while the benefits arising from surface manuring, in other respects, more than counterbalance any possible loss of ammonia arising from this practice. * * * *

The soluble and valuable substances (of manure) are not lost to plants, by being carried into the soil before they are needed by growing plants. It has been conclusively shown by eminent scientific authorities, that any good soil, containing a fair proportion of clay and carbon, is capable of taking up and retaining effectually ammonia, lime, potash, soda, &c., in a soluble form, so that *little, if any, passes off in the under-drainage water of such soils.* These substances, it is true, may wash from the surface, but *they cannot pass through a good soil and go off in the drainage water.* * * * *

When the surface manure decomposes, its elements are washed into the soil, in a state of solution precisely fitted to meet the wants of plants, and they become, themselves, active agents in promoting further decompositions and chemical changes in the entire body of the soil.

Manure then, I say, chiefly upon the surface. * * * * * Top-dress your grass after mowing in July or August, under a burning summer sun; top-dress in the fall before and during the autumn rains; manure the surface, while snow is on the ground, while the March winds blow, and while the April rains fall. [?] Manure your grass instead of your corn and wheat, broadcast, at any time when you have manure and leisure, and I will guarantee that you will be abundantly satisfied with the result."

Skilful observers of the true principles of rotation will note the advice above given, "Manure your grass instead of your corn and wheat." Our too common practice of mowing grass lands, without manuring, until they are exhausted, and then resorting to laborious and expensive processes of ploughing and cropping with manure, until the land is brought to a condition to be seeded again—*this is not "rotation."* It is merely restoration of the soil from a worn out and useless condition. A proper method of rotation requires that the land shall be in good condition, every year, for the crop of that year. The contrary method is almost, though not quite as bad, as if a laboring man should work four days and nights, without stopping, and then take medicine to renovate his system. If the grass land is kept in high condition, every year, by plentiful top-dressing, and avoidance of the ruinous practice of feeding, it is then in precisely the best condition for the plough-crops, which are required to follow. The sod of such land is itself a manure for the succeeding crop. Witness the clover, which, in the great wheat-growing districts, so commonly precedes the wheat. But, as before stated, it is not likely that grass-lands will be kept in that condition, unless there is a supply of manure for

top-dressing, at the right season of the year. If by a change in the habit of making and preserving manure, we should come to the habit of having our mowing lands, at all times, in the most productive condition, this, of itself, would be a revolution in the ordinary New England farming.

And it should not fail to be observed, that the broadcast top-dressing of grass lands, with well ripened manure, in the fall of the year, is the easiest and cheapest of all possible methods of manuring land. Other methods must also be used in their turn, but this is the least laborious and least expensive of all, and it is therefore an important problem to make it as fully available as may be.

Recurring to the case of stubble-fields—a part of these are designed for grain crops the succeeding year, and the manure, if any is applied, is of course broadcast. In the case of winter wheat and winter rye, we have a long settled experience upon the method of fall ploughing and manuring. No farmer ever hesitated to prepare his land in August or September for these crops, because he feared that the fall and winter would wash away or evaporate his manure, or that the soil would settle and harden, under the influence of rain and frost, to the injury of the plants.

As to the other stubble-fields, which are to bear crops the next year, in furrows or hills,—Indian corn and roots, sometimes called the “hoed crops,”—whether the manure, if applied in the fall, should be broadcast, or placed in furrows first opened for the purpose, and then covered over, to await the seed time in spring—this, perhaps, would primarily be, a question of the *quantity* of manure available. A farmer, who had at all times an ample abundance of fertilizers, and who was able and willing to employ the proper force to prevent weeds from stealing one-half the dressing, might, perhaps, adopt the economy of broadcast manuring in autumn, and in that case, the opening of furrows in spring, to receive the seed, would be merely a part of the process of planting. But, usually, the limited stock of manure at command seems to compel the method of placing in the furrows or hills, only enough for the plants which are to grow in those lines. And here, perhaps, is to be apprehended the chief practical difficulty in adopting the method of fall manuring for hoed crops. The labor appears to be increased. The land is to be ploughed, (probably harrowed,) the furrows to be opened, the manure to be deposited in them, and the furrows to be covered again—the dropping and covering of the seed to come afterwards, in the spring. This is precisely the

method, however, adopted by skilful growers of turnips, save only, that the whole or a part of the work is done at a different season of the year. Whether such a method of preparing and dressing the land, in the fall, for the Indian corn and potatoes of the next year is practicable, with due economy of time and labor, may be partly a question of contrivance, good management and ingenuity. Convenient apparatus both for opening and for covering furrows is now common enough, and since the well decomposed manure, kept over from April to September, and properly taken care of meanwhile, will be found to be in a comparatively dry and friable condition, it may not be too sanguine to anticipate that a manure cart will be devised, with an apparatus attached, to open and close the furrows, while the manure is dropped, intermediately, as the cart is drawn across the field.*

If some such method is practicable for these crops, then the business of planting, in the spring, may be the lightest farm-work of the year. The boys and girls of the farm can do it all.

If these views are, to any degree correct, a large part of their usefulness will be found in the help they suggest against what is really the greatest difficulty in New England agriculture. The most terrific enemy of the New England farmer is *drought*. Against all other climatic disadvantages, we have some compensating balances of gain, and can employ some sort of forecast. In a very wet season, grass will grow and forage roots will thrive, however corn and grain may suffer. A late frost in June, or an early frost in August, may cut off or diminish the yield of one or more crops, but something else will be saved. But in a severe drought, nothing is safe. Everything is liable to be destroyed.

Provisionally, droughts of sweeping destructiveness are rare in our climate. But partial droughts of much severity are very common, and the New England farmer is exposed to suffer the diminution of some of his crops, very frequently, from this cause. A drought in spring or early summer is least common of all. It is in midsummer, or after that time, that they are most common and most severe. But if we could foresee a drought in May or June, in what condition would we desire to have our crop lands, at that

* A mechanical difficulty may appear to present itself—the traction of the furrowing and covering apparatus, in addition to the weight of the load. But the manure will be lighter, by a large per-centage, than that taken from heaps in the spring, and the cart may be much less cumbersome than such as are used in ordinary spring work. The ground, also, will be drier, usually.

time? In the condition of clods of earth, not yet broken and pulverized, with masses of manure, not yet decomposed and dissolved—both clods and manure drying and baking, harder and harder, every day, in contact with the rootlets of the struggling plants? Or, in the condition, in which these lands would certainly be, if they had been lifted by the plough, the fall before, to the disintegrating influences of rain and frost, and if the manure had been, by like influences, thoroughly dissolved and distributed through all the feeding-ground of the plants? We cannot foretell or foresee a June drought, but we can put our plough-lands into that condition, beforehand, which will give to the growing plants their only chance of living successfully, through such a visitation. And, in like manner, if the drought does not occur till after the beginning of July, it is easy to see that if the young plants of the year commence their growth, at the first moment of their proper growing season, and go on rapidly and vigorously, with an abundant supply of food from the start, all ready for them as soon as and as fast as they need it, they will have gained, by mid-summer, a strength and substance of root and stalk, which will give them a reasonable promise of holding out, and maintaining their ground through several weeks even, of such later drought.

It is precisely with young plants as with young animals. Both are nourished by food. Both must have their food at the moment they begin to live, and it must be of the right kind and in the right form. Wild plants have their food supplied by nature, and, accidents excepted, it is always suited to their condition. The annual crops of our agriculture must have their food furnished by the hand of man. If they begin to grow at the middle of May, but have no proper supply of food till the middle of June, their life is of doubtful utility. The farmer who puts into the ground by the side of the seed a quantity of material for plant-food, which he knows, nevertheless, will not be fit for food, until some weeks after the germ has put forth from that seed, might take a lesson from himself, as a cattle-grower, and consider the good sense of that practice, by which he aims, above all things, to secure a rapid and vigorous early growth of his young animals. It is not by compelling them to *wait* for their food.

The entire difference between profit and loss, both in the raising of crops and the growing of cattle, often depends upon the single question, whether or not the crop or the animal was *well fed*, at

the earliest periods of its growth? If it was, there is ground for a calculation of profits—if not, the result may be a laborious and expensive loss.

If these theories of fall cultivation are thought worthy of being subjected to the test of practical experiment, it is a fortunate circumstance that the test can be applied in a small way, without any elaborate preliminaries, and without material risk of loss. Any farmer can try the question. A few square rods of land, one-half ploughed and dressed in the fall, the other in the spring, both receiving the same treatment in the season of growth, will be likely to assist in forming a judgment upon the two methods.

It is an encouraging consideration, in offering these suggestions for a very material change in the order of our methods of cultivation, that this change promises to be, in reality, a direct recurrence to the laws of nature, and a reliance upon those laws. Much of the farmer's life appears to be a struggle against natural forces. His highest attainment will no doubt be, when he brings himself into the most harmonious and faithful coöperation with nature, and with the wisdom and energy of that Divine Providence, of which nature is only the manifestation.

The theories and suggestions advanced in the foregoing pages, as originally put in form for an agricultural address, (October, 1865,) were the result, merely, of the writer's *reflection*. He had had no experience in such matters, and was not then aware that such views had been adopted in practice, or put forward as theory, by any others.

Subsequently, the following instances of such practice, and allusions to it, came to his notice.

At the delivery of the address at Gorham, Friend Samuel Taylor of Fairfield in this State, who was present, took the occasion to state publicly, that his townsman, Mr. Daniel Bunker, an experienced farmer, made it a settled practice to prepare his land for Indian corn precisely in this method, and with a success, in which he was not surpassed by any grower of this crop, in Somerset county. Mr. Bunker's views and practice are stated more particularly, below, in his own words.

The author of the English book, "*Chronicles of a Clay Farm*," (4th edition, 1857,) treating of some points in vegetable chemistry, has, incidentally, one or two noticeable sentences, and an interest-

ing reference to an ancient practice. Speaking of the "labors of the dung-cart, as at present carried on," as objectionable and involving loss, he says, "but with autumn and winter manuring, it is different."

* * * "Rightly, then, so far as their knowledge went, did our *forefathers*, who knew nothing of turnip culture, *plough in their long manure before winter*." And in the same connection, he speaks of the "poor practice" of applying "to a green spring-crop under the burning sun of June, the treasures of the farm-yard, whose spirit is exhaled before the body is buried, and whose body is not rotted time enough to afford its remnant of inorganic food to the crop it is applied to."

"Who can wonder, then, that the 'artificials' should sometimes beat the long manure, for spring application? And who can doubt, that we wise moderns have left half our lesson unlearned, in having *changed the time of manuring*, without changing also the *condition of the manure*?"

In an article in the Edinburgh Review, for January, 1866, the title of which is "Corn and Cattle," the writer, undertaking to trace the improvements in English agriculture, which have succeeded the repeal of the Corn Laws, comes at length to the mention of the steam plough; and in proceeding to state a comparison between the work of such a plough and the labor of horses, he has these sentences:

"But it was discovered that the only method by which root crops could be grown with certainty and success, was by preparing the land for them in the autumn. No amount of mechanical trituration could equal what some writer terms 'nature's wayward team, *frost, snow, wind and rain*,' and, to avail himself of these gratuitous forces, the farmer must turn a deep furrow in the field reserved for his crop, before such forces began to work. * * * It was evident that horse labor would be economised, inasmuch as one ploughing, at the right time, surpassed in effect many at the wrong time; that an early seed-time would be secured; that a far better time for the cartage of manure would be attained; and that, instead of leaving the land virtually closed to the winter's rains and the chemical effects of the atmosphere, the rain, sinking where it fell, would leave its fertilizing properties in its passage downward, and invite the air to follow. But the farmer's horses were limited in number," &c.

In the proceedings of the Massachusetts State Board of Agriculture, for 1864, (Flint's 12th Report,) there appears, in a report of a meeting of the board held at Greenfield, in December, a discussion upon the "Corn Crop," from which the following extracts are made.

Dr. Hartwell, of Southbridge, was the principal speaker, and, amongst other things, made the following statements :

"I plough my land in the fall, smooth over the surface, and then apply my manure; and I usually work it in deep with a horse plough. I spread the manure from the cart, and do not tip it up in heaps, because it is impossible to spread it evenly in that way. * * * I have tried spreading the manure on the ground in the fall and leaving it until spring, but I would not, as a general thing, advise it. If you put it on a westerly declivity, it will blow away; but, if you have a piece of land that is protected by woods, or that has an eastern or southeastern declivity, there is no harm in putting on your manure in the fall. There was a premium offered by our society for the best acre of corn. I measured off one acre, and weighed the crop after it was husked, and it averaged eighty pounds to the bushel in the cob, and the acre produced a fraction over one hundred bushels, for which they gave me the premium, \$18.

Mr. Tidd, of New Braintree, asked, Was your land green-sward or old soil?

Dr. Hartwell. This last year, it was green-sward, that had been mowed some four years. It was turned over, thoroughly smoothed down, and the manure spread over it. To do this, it is necessary to keep a stock of manure one year ahead. I think manure grows better by keeping. I think it is better to plough in the fall, than in the spring.

Mr. Perkins. What time in the fall do you prefer to plough? Does it make any difference, whether it is the first of September or the latter part of November?

Dr. Hartwell. I think September is the best, but farmers must do as they can. They cannot always do the work of the farm at the time they ought to. If I had my choice, I should do it in September, but October or November will answer the purpose.

Mr. Garfield. If I wanted to raise an extraordinary crop of corn for one year, I should certainly pursue the same method that the doctor does; but it is a question in my mind whether manure put on in that way will serve the best interests of the farmer in a succession of years. * * *

Dr. Hartwell. I can state one fact that will perhaps throw some light upon the question. Several years ago, I ploughed an acre and a half, in the fall, in the manner I have described; I proposed to make a nursery upon half of it, and I put on the manure and spread it upon the surface of the soil, but the frost followed so soon, that I was not able to work it in. I changed my mind in relation to planting a nursery, and in the spring I spread an equal quantity of manure over the remainder of the land and planted it all with corn. *Where the manure was put on in the fall, the corn was a great deal the best.* I could see it in the rows, contrary to my expectation, for I expected that I had lost something on my manure. The next year the land was sowed with oats, and *I could see the line where that manure came, that I put on in the fall.* Next year it was sown to grass, and *that line was seen three years afterwards.*

* * * * With regard to the system I have spoken of, the farmers are not in a situation to practise it. There are no farmers in our section, that I know of, who have retained a year's stock of manure. They would be under the necessity of losing one year's crop of corn to get into the system. [?] For that reason they usually put on, in the spring, the manure that has been made during the winter. But I certainly would recommend to every farmer, who raises corn, to have one year's stock of manure on hand, if he can possibly get into that situation."

The practical results of Dr. Hartwell's method of cultivation, appear to give assurance that it rests upon a sound theoretical basis. A very valuable and independent confirmation of this is afforded by the long experience of our own fellow-citizen, Mr. Bunker, of Fairfield, who adopted the practice of ploughing and manuring in the fall, nearly forty years ago, and continues it successfully to this time. In a letter from him to the writer, dated Oct. 12, 1866, the following statements are made:

"I am decidedly in favor of manuring lands in the fall, say about this time, or during the month of October. My practice from 1827 to about 1840 was to plough my ground at this season of the year, and haul out and spread my manure on the furrows and harrow the ground and mix the manure with the soil. Next, in the spring, as early as the ground would admit, harrow the same thoroughly, and plant or sow, as I thought best. I found in this practice that the land received all the strength and nutriment the manure possessed, and I produced better crops, and with much less labor. * * * I believe the principle is well settled, that vegetation will not take root and grow upon new, strong manures; therefore it must lie, and be reduced in some way, to be adapted to the growth of vegetation. * * * Lands dressed in the fall, with the full strength of the manure, will hold productive twice as long."

It is interesting to compare this last proposition with Dr. Hartwell's observation of the effect of one fall manuring, through several following years.

Mr. Bunker states further:

"Since about 1840, I have planted my corn as Friend Taylor stated. In the month of October, I plough my ground, and harrow it and furrow it out in the usual way, and drop out the manure in the same way as farmers do in the spring, and then cover the manure about the same as they do, when planting at that season. In the spring, say from the 10th to the 15th of May, I mix up, with a hoe, the soil, which is on the top of the manure, and at the same time mellow the manure well in the hill, and open the top of it very lightly, and drop the corn, and cover it as in the usual planting."

Referring to his crop of 1865, he states that it was the second crop of corn on the same piece, prepared and manured both years, in this way—the land being previously in quite a poor state of cultivation, and having no other dressing whatever, except this manuring in the hill, in the fall. He adds, “I had, when gathered, the second year, from about one and a quarter acres, 200 bushels of ears, and I think the handsomest corn I ever saw. I carried a trace of it to the fair at Waterville, and took the first premium.”

The conclusions of the Massachusetts Board upon Dr. Hartwell's method of cultivating corn, appear not to have been determined. Mr. Agassiz, the distinguished naturalist, who was present as a member of the Board, made some very valuable suggestive inquiries, respecting the depth and width, to which the rootlets of the corn extend, in seeking their nourishment from the earth and the manure. Dr. Loring proposed that a vote should be taken upon the two questions, Would you plough sward-land and put the manure on the surface, in autumn, for a corn crop? or, Would you plough sward-land in the spring, and turn under the manure, for a corn crop? Mr. Tidd said he thought the diversity of opinion in respect to this matter arose from the differences in soil. Dr. Loring expressed himself as of the same opinion, and said he was satisfied each gentleman would vote upon these questions according to the character of the soil he cultivates. Mr. Bull said the questions involved so many considerations of soil and climate, heat and moisture, and succeeding crops, that he would rather have it laid over for future consideration, than to take a vote upon it now. Dr. Hartwell himself, also, objected to the Board undertaking to decide as to the best method of applying manure, and have it circulated, for the farmers to follow. He thought they were not prepared, now, to make so important a decision.

The subject was then laid on the table, and does not appear to have been resumed.

At the meeting of the Board, the following year, an essay was read by Mr. Stedman, on “Manures and their Application,” (Flint's 13th Report, p. 197,) in which occurs the following passage :

“At what time shall we apply manure? It may be thought this question is not worthy of notice. I cannot, however, think it is wholly immaterial, although admitting a somewhat wider range. As top-dressing for grass, I would apply in autumn, or in early winter, if the ground is free from snow.

For spring crops, much is said, of late, in favor of the same time of application. While I favor this theory, and have been satisfied with its results, so far as I have observed, yet I am not sure that we have sufficient data to sustain this as the best course. And beside, spring is the time, when we have at command the largest supply. Let it now be used for hoed crops."

And so, the question was dismissed—being left, unfortunately, to rest upon the merely accidental fact (as distinguished from an essential principle) that the accumulations of the winter happen to be in the barn-yard, in the following spring.

But, in the same volume, is a very valuable matter of fact testimony, well worth quoting. All readers of Mr. Flint's Reports are familiar with the splendid herds of cattle raised by the Messrs. Anderson, of Shelburne. At page 308, in a report upon "the principal agricultural features" of Franklin county, reference is made to their stock, and the writer adds:

"The Andersons cut a very fine quality of hay on their farm, getting four tons per acre from their best lands, mowing twice. *They keep all their manure over one year, and then, without composting, spread it on their grass lands in the fall.*"

At the meeting of the previous year—the same at which Dr. Hartwell's statements were made—one of the Messrs. Anderson was present, and took a leading part in a discussion upon the Improvement of Pasture Lands, in the course of which he said:

"The probability is that the value of the stock, when I went on to the farm, was not more than five hundred dollars. To-day, I would not take four thousand dollars for my stock. I have forty head, and I believe they would sell for that at auction.

Well, there has been no mystery about the matter. *I have let nature work.*"

The testimony respecting the grass-lands of the Messrs. Anderson is like "a nail in a sure place." Habitual top-dressing in autumn—a reserved stock of manure as the basis of the treatment—four tons of hay to the acre to show for it, and herds of cattle, among the finest in New England, to show along with it. This is no mystery, and needs no logic to support it. The practice, in itself, appears to be pure reason.

CROSS-BREEDING.

It will be recollected that a paper on the Principles of Breeding bearing upon the improvement of domestic animals occupied a large portion of my report for 1860. The favorable reception given to that paper in connexion with the deep interest now manifested by stock growers throughout the State, and the general desire to learn whatever is to be known on the subject, induce me here to present two papers written by W. C. Spooner, V. S., for the Journal of the Royal Agricultural Society on cross-breeding in sheep and horses.

ON CROSS-BREEDING IN SHEEP.

It cannot be denied that the natural laws by which the preservation of animal species is effected are involved in considerable mystery, and though the subject is well worthy the attention and study of the practical man as well as of the physiologist, experience is yet fraught with so much contrariety that attempts to lay down any certain guide on it have for the most part been received with considerable distrust. No sooner does the inquirer imagine that he has discovered some particular principle which obtains universally, than he is met by circumstances which apparently upset his previous conclusions. The maxim "*like begets like*," for example, is a rule having very extensive sway, yet, as propagation is the work of two parents, the respective influences of the one or the other is a matter involving considerable diversity of opinion, and prevents anything like a certain conclusion being arrived at. We cannot do better than consider, on the very threshold of our subject, the respective influence of either parent; for on this the merits of pure or cross-breeding must principally depend. The most probable supposition is, that propagation is done by halves, each parent giving to the offspring the shape of one-half of the body. Thus the back, loins, hind-quarters, general shape, skin, and size; follow one parent; and the fore-quarters, head, vital and nervous system, the other; and we may go so far

as to add, that the former in the great majority of cases go with the male parent, and the latter with the female. A corroboration of this fact is found in the common system of putting an ordinary mare to a thorough-bred horse; not only does the head of the offspring resemble the dam, but the forelegs likewise, and thus it is fortunately the case that the too-frequently faulty and tottering legs of the sire are not reproduced in the foal, whilst the full thighs and hind quarters which belong to the blood-horse are generally given to the offspring. There is, however, a minority of cases in which the opposite result obtains. That size is governed more by the male parent, there is no great difficulty in showing;—familiar examples may be found in the offspring of the pony-mare and the full-sized horse, which considerably exceed the dam in size. Again, in the first cross between the small indige-nous ewe and the large ram of another improved breed—the off-spring is found to approach in size and shape very much to the ram. The mule offspring of the mare also very much resembles both in size and appearance its donkey sire,

These are familiar examples of the preponderating influence of the male parent, so far as the external form is considered. To show, however, that size and height do not invariably follow the male, we need go no further for illustration than the human sub-ject. How often do we find that in the by no means infrequent case of the union of a tall man with a short woman, the result in some instances is that all the children are tall and in others all short, or sometimes that some of the family are short and others tall. Within our own knowledge, in one case, where the father was tall and the mother short, the children, six in number, are all tall. In another instance, the father being short and the mother tall, the children, seven in number, are all of lofty stature. In a third instance, the mother being tall and the father short, the greater portion of the family are short. Such facts as these are sufficient to prove that height or growth does not exclusively follow either the one parent or the other. Although this is the case, it is also a striking fact that the union of tall and short parents rarely, if ever, produces offspring of a medium size—mid-way, as it were, between the two parents. Thus, in the breeding of animals, if the object be to modify certain defects, by using a male or female in which such defects may not exist, we cannot produce this desired alteration; or rather, it cannot be equally produced in all the offspring, but can only be attained by weeding

out those in whom the objectionable points are repeated. We are, however, of opinion that, in the majority of instances, the height in the human subject, and the size and *contour* in animals, is influenced *much more by the male* than the female parent; and, on the other hand, that the constitution, the chest, and vital organs, and the forehead generally, more frequently follow the female.

We have dwelt on this point the more because on it hinges the difficulty of effecting certain improvements in breeding by means of crossing, and the still greater difficulty of establishing a new breed by such means. So great is this difficulty that many breeders, finding their attempts at such improvements so frequently baffled, or observing this to be the case in the practice of others, cling with superstitious tenacity to the doctrine of *purity of blood*, believing it to be the *Ark* in which alone true safety is to be found.

Now *pure breeding*, which, when carried to an excess, is called *in-and-in* breeding, has its advantages as well as its disadvantages. Its friends observe with great force, that when we have in breeding reached great excellence, it is folly to risk the loss of such excellence by means of crossing; and the more so as the defects of a parent may disappear in a first or second, and re-appear in the third or fourth generation; "*breeding back*," as it is commonly termed. A friend of the writer's, Mr. John Clark, of Lockerly, a strenuous advocate of pure breeding, observes that a correspondent in Suffolk informs him, that he had seen the cross tried between the old Norfolk and Down sheep, and the first cross was admirable, but they soon became disproportioned and unsightly; also the Down and Leicester in some midland counties figured for a time, and then for the same reasons were given up, and such he thinks will be the fate of the New Oxfords, or the mixture of the Cotswold and the Down. He adds, that for the last four years he has used rams from the cross with Down ewes, and the offspring answered his purpose for *falling* lambs, but one lamb in ten presents unmistakable evidence of its mongrel origin.

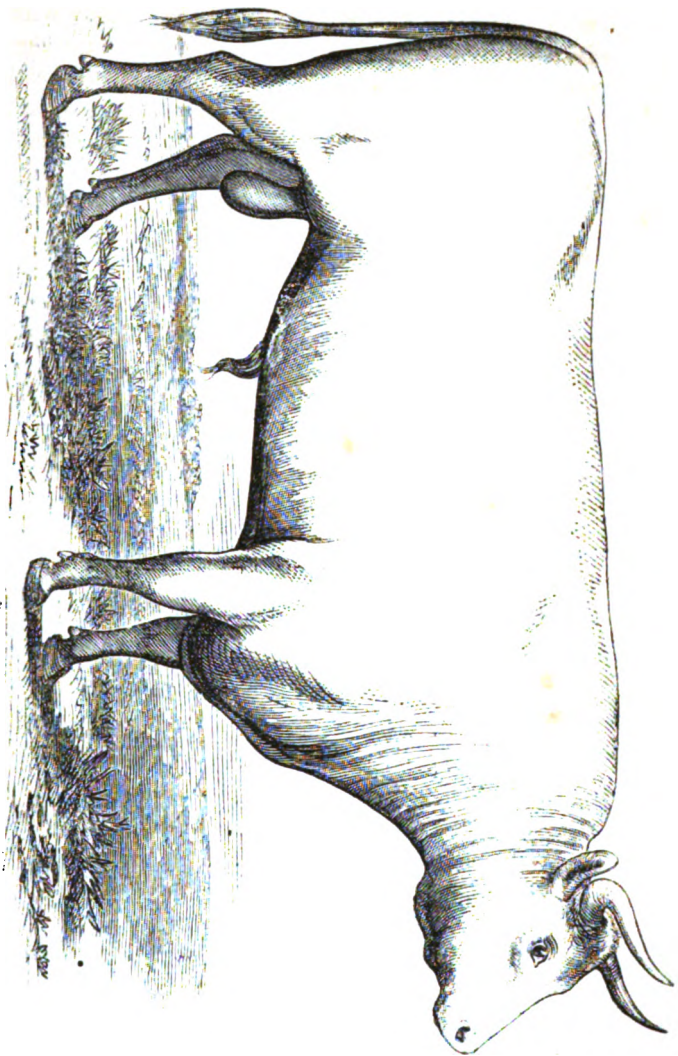
Again, it is urged that great excellences can only be perpetuated by union with similar excellences, and beyond all this that there is a certain amount of advantage from an unstained lineage—from the very possession of breed, as it is designated. The objectors to *in-and-in* breeding urge, that by so doing we engender weakness of constitution, diminution of size, hereditary diseases, and also a tendency to barrenness; but it is argued in reply to such objections, that they occur from want of sufficient

care in weeding out defective animals, whether as respects constitution or size. It is a well-established fact, that in the human subject too close affinity, such as the intermarriage of cousins, tends to mental diseases and consumption; and we can readily imagine that when there is a tendency to such diseases in a family, this tendency must be greatly increased by intermarrying with a member of the same family. Animals not being subject to mental diseases, the observation does not apply to them with the same force, but it is true in a lesser degree. At the same time, unless the choice is extremely confined, most of the evils of pure breeding can be avoided by careful selection and vigorous weeding. Examples of pure breeding are familiar to us in the admired race-horse, the first-class short-horn, and the Southdown sheep; but so far as purity of breed alone is considered, the mountain sheep of Wales, the Highland Scotch cattle, and the Shetland or Welch, are equally pure; but whilst the latter have been propagated without care or attention, the former have, by careful selection and vigorous weeding, been considerably enhanced in value. A striking example of long continued pure breeding is afforded by the Leicester flock of Mr. Valentine Barford, of Foscoate near Towcester, who has the pedigree of his sheep from the day of Bakewell in 1783 to the present time, and since 1810 he has bred entirely from his own flock, sire and dam, without an interchange of male or female from any other flock. He observes, "that his flock being bred from the nearest affinities—commonly called in-and-breeding—has not experienced any of the ill effects ascribed to the practice." His flock is remarkably healthy, and his rams successful, but his sheep are small.

Let us pause for a few minutes to consider what constitutes *breed*, or rather what is meant by high breeding. We shall find that it refers to very different desiderata in different breeds. In the thorough-bred horse it signifies a very high development of the muscular and nervous systems, accompanied by such mechanical structure as when united with it constitutes the highest manifestation of speed and endurance. In the ox, however, it implies very different qualities, viz., early and rapid growth—the development of flesh or muscle on the parts most prized for food—a disposition to lay on fat; these, with the possession of the smallest amount of bone consistent with strength and health, are the principal characteristics of a well-bred animal. Instead of the highly-nervous temperament of the race-horse, we have here a quiet lazy

disposition ; in fact, a lymphatic temperament, by the influence of which the digestive organs reign supreme, and convert for the public benefit a given quantity of food into the utmost amount of flesh and fat. The same observations apply with equal force to the sheep, and in a still stronger degree to the pig. A well-bred pig is the incarnation of everything indolent and lethargic, and the very antipodes of that high organization and nervous development which belong to a high-bred horse. Examples of pure breeding are probably to be found in greater perfection in cattle than in sheep. The *Devon* and *Hereford* cattle have descended through many generations in unbroken lines, and owe the perfection which they have attained to careful selection. The *Short-horns*, although considerably more modern in their origin, and moulded into their present form by a series of successful crosses, have yet been preserved pure with even more rigorous care than the other breeds which we have mentioned. The solid frame and great feeding properties of the *Herefords*—the quality of beef and richness of cream, as well as working properties of the *Devons*, are well known and generally appreciated ; and yet these qualities are insufficient to resist successfully the encroachments of the *Short-horns*, whose early maturity and disposition to lay on both flesh and fat, joined with fair milking properties, are such that they outnumber both the other breeds combined. As, however, the leading purpose for which a breed of cattle is kept is generally well defined, whether for the purpose of the dairy, or for that and early fattening, or simply for beef or for working as well, and, as each of these purposes can be well attained by keeping a pure breed, there is not the same temptation or inducement to cross, which is often experienced in sheep-farming, in order to insure specific advantages which cannot otherwise be attained.

This being the case, we may most advantageously devote our remaining space to the practice of crossing, as illustrated in sheep-breeding. We may start, then, with this principle, that to cross for crossing sake is decidedly *wrong* ; that, unless some specific purpose is sought for by crossing, it is far better to cultivate a pure breed. The country is, indeed, under great obligations to those gentlemen who carefully preserve their breed intact, and endeavor to improve it by weeding and selection. We can readily excuse their prejudices, if they have any, and have no wish to interfere with their creed. Let theirs be the office to preserve our fountains pure and undefiled, and to supply others with the best



NELSON 75.

Devon Bull, calved April, 1857. Bred by Messrs. S. & L. Harburt, Winchester, Connecticut. The property of John K. Anderson, Maplewood Farm, South Windham, Sire, Noscius (287), Grand sire, Imported Albert (2). Dam, Strawberry (1061), by Bloomfield (148). Grandam, Strawberry, by Bloomfield (148). Gr. dam, Strawberry, by Exchange (197). Gr. gr. dam, Strawberry (1062), by Taurus (320). Gr. gr. gr. dam, Old Strawberry, "Coke Devon." Nelson won first prize as a yearling, and first, as a two-year old, at the Connecticut State Show; also the first prize as a mature bull, at the same in 1862; the second prize, at the New England Show, at Springfield in 1861; and the first prize at the second Exhibition of the same Society at Concord, in 1863. At 3 years of age, length exclusive of head and neck 54 feet, height at shoulder of feet, girth 6 feet 10 inches, weight 1600 pounds, in working condition.

sources of improvement by crossing. And we do not confine our praise to those merely who, keeping in the high road of fashion, have succeeded in securing, both by prizes and prices, a full and sufficient reward for their labors, but would award it to those also who, keeping perhaps in the second rank, have yet supplied their neighbors and the public with valuable pure-bred sheep at moderate prices.

History fails to supply us with the origin of our various breeds of sheep; but we doubt not that, for many centuries after the time of the Romans in this country, certain distinct breeds were perpetuated, with little improvement and little change. The progenitors of the present Southdown or Sussex breed, inferior as they were to their descendants, ranged probably, in the days of the Romans, over the Southdown hills; whilst another breed, now happily extinct, occupied for the most part the hills and downs of Wiltshire and Hampshire. A large, bony, narrow, but active sheep, with large head, Roman nose, and long curly horns, high in the withers and sharp in the spine, but yet the largest short-woolled breed in existence, were the denizens of these counties during the last century.

In Wiltshire, although they remained as a pure breed much longer than in Hampshire, yet, as far as can be learnt, they were supplanted by the Southdown, whose superior qualities displaced the old Wiltshire altogether; and we are not aware of any instances in which they were crossed, except for the purpose of crossing them out by using again and again the Sussex ram. Mr. James Rawlence of Bulbridge, near Wilton, whose large practical experience, both as sheep-breeder and land-agent, stamps his authority with considerable weight, observes in reply to the author's inquiry, "The last flock of this breed (old Wiltshire) disappeared about the year 1819, and the substitution of the Southdown commenced late in the last century. In many cases Southdown ewes as well as rams were brought out of Sussex to replace the horned flocks, but in numerous instances the two breeds of sheep were crossed, and by the continued use of the Southdown ram the chief characteristics of the horned breed were merged in the Downs. The cause of the very rapid substitution of the Down for the Old Wiltshire may be found in the fact of the large number of enclosures of common fields which then took place. The sturdy, horned wether was thoroughly competent to take care of himself when the system of feeding in common prevailed, but when each farmer

could keep his flock separate, an animal of superior quality was preferred."

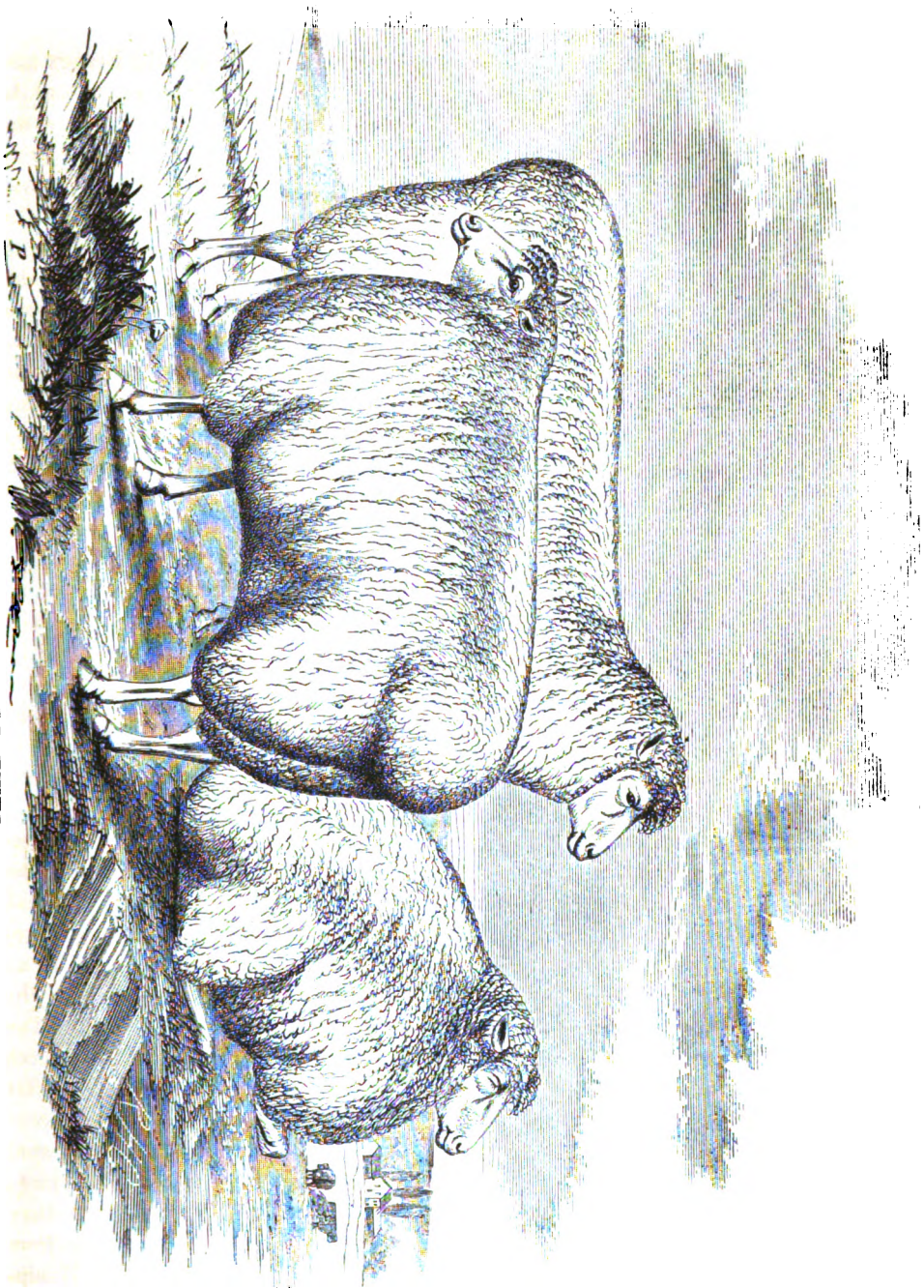
In Hampshire, on the other hand, where the same sheep prevailed and were valued for their hardihood, and their powers of travelling far, and folding hard—properties so valuable when the fertility of the light soils was mainly kept up by these useful manure-carriers—these sheep were extensively crossed. Previous to the close of the last century, the Southdown sheep had been greatly improved by careful selection, and the name of the late Mr. Ellman was well known for his eminent services in bringing out and improving the latent qualities of this valuable breed. About the beginning of the present century the sheep-breeders of North Hampshire began to bestir themselves, and a few enterprising farmers procured some rams from Sussex, of the Southdown breed. Finding the experiment successful, it was repeated again and again, care being taken to select the largest, coarsest, and *blackest*-faced rams, which it was thought would suit the coarse sheep with which they had to amalgamate. How many crosses with the pure Sussex were used we cannot ascertain, but enough materially to alter the character of the breed, to cause the horns to disappear, and to change the color of the face from white to black; and, with these changes, to impart a more compact frame, a broader back, rounder barrel, shorter legs, and superior quality altogether, and yet preserving the hardiness and the disposition to make early growth, which the original flock no doubt possessed, and with it the large head and Roman noses, which form so distinguishing a characteristic of the Hampshire Downs, and which are unquestionably derived from the original breed. Indeed, it is only necessary to inspect a drawing of the original Hampshire or Wiltshire sheep to become thoroughly satisfied as to the source from whence it derived the colossal head which some fifteen years since was regarded as, I will not say an ornament, but an indispensable appendage of the breed. Uniformity of color is also a great point with most Hampshire breeders, with what amount of advantage we cannot say, but black tips to the ears as well as black faces are deemed essential, and any crossing with speckled-faced sheep, such as the Shropshire, is in consequence viewed with dislike.

It was not until the Wiltshire sheep-breeders began to produce some large but more symmetrical animals that the Hampshire men began to consider whether it was not possible to reduce the size

of the heads, without losing the characteristics of the breed. By attention and careful selection this has been accomplished, and we have now a breed of sheep which is admirably adapted to the present system of fattening off at much earlier ages than formerly, and, for the most part, as tegs and two-teeth sheep. It is certainly not owing to any aristocratic patronage that the Hampshire sheep have forced their way into public estimation. They have neither been upheld by agricultural societies or agricultural writers, nor have they been launched into public favor as winners of prizes; on the contrary, they have been laughed at, criticised, and condemned; and yet they have not only held their own, but have spread far and near, so that the county in South England where none are to be found is probably the exception, and not the rule. The Hampshire sheep may, therefore, be instanced as an example of successful crossing, and as a proof of what can be done by the male parent, in changing, in very few generations, the character of the original, and yet retaining some of its good qualities, thus forming a breed more intrinsically valuable than either source from whence it is derived. It has been truly said that the public is wise though composed of fools; and undoubtedly, when the pocket is concerned, the decision of the public is, for the most part, correct. Thus at the various autumnal fairs large lambs are in the greatest request, and command the highest prices, which in itself is a sufficient proof that with a given amount of food they make a greater quantity of mutton. It was found, indeed, by Mr. Lawes, in his careful and valuable experiments, that the Hampshire sheep, although they were surpassed by the Cotswold, yet exceeded the Southdown in the amount of mutton raised from a given weight of food. The greater economy of fattening a young over an old animal may be readily explained by the fact, that whilst the latter increases in fat alone, the former does so both in flesh, fat, and bone, and thus the latter can assimilate a greater amount of the nutritious properties of the food, and is consequently a more profitable feeder.

We have no reason to suppose that after a few generations the Hampshire breeders continued to use the Sussex rams; as soon as the horns were gone, to which, perhaps, the Berkshire Notts contributed, and the face had become black, they employed their own cross-bred rams with the cross-bred ewes. If, then, we were asked what original blood predominated in the Hampshire sheep, we should unquestionably say the Sussex; but if the further ques-

tion were put, Is the present breed derived from the Sussex and the original Hampshire alone? we should express a doubt as to such a conclusion, as there is good reason to consider that some improved Cotswold blood has been infused. Some thirty years since a Hampshire farmer still living (Mr. John Twynam) used the improved Cotswold ram with his Hampshire ewes, and the first cross exhibited a remarkable proof of the preponderating effect of the male. The produce, in size, general appearance, and wool, partook far more of the ram than of the ewe, and it was thought that a most valuable breed had been obtained, which, with the increased size, and weight of fleece, and disposition to fatten of the Cotswold, would combine the hardiness and folding capabilities of the Hampshire. It was found, however, no easy task to perpetuate such a breed after the first cross—the defects of the one parent or the other would appear and re-appear in the second and third generation, and it was only by careful weeding that anything like uniformity could be attained. Mr. E. G. Young, of Broadchalk, Wilts, a close observer as well as an excellent farmer, informs the writer that he, as well as his brother, purchased Mr. Twynam's rams for several years, and has, he conceives, derived advantage from the cross. Mr. Rawlence observes, that the points he has arrived at have been to produce an animal yielding at an early age the largest possible amount of mutton and wool, which he considers the *sine qua non* of sheep breeding; and he adds, it is difficult to estimate the enormously increased production which has within the last few years been obtained by keeping this object steadily in view. Whilst he highly appreciates the high-bred Southdown, he is convinced that the present system of farming demands a larger description of sheep, and one which will produce a heavy weight of wool at an earlier age, and he is not quite sure whether a cross with the Cotswold would not produce a more profitable animal. The absurd fashion of drafting good sheep, if they have not black faces and ears, tends to retard the improvement of the carcase. After some few years a change of farm and other causes led to a discontinuance of the experiment, yet many of the cross-bred rams were sold and let to sheep-breeders both in Hampshire and Wiltshire; and although after dipping once or twice into this breed they then ceased to do so, yet they have continued breeding from descendants of the cross, and thus, in very many of the Hampshire and the Wiltshire flocks, there is still some improved Cots-



IMPORTED COTSWOLD EWES.

Bred by Robert Garne, Aldsworth, Northampton, England. Imported by and property of Rurdett Loomis, Windsor Locks, Conn. Winners of 1st prize at Westover that stocked their flocks.

wold, and, consequently, Leicester blood.* Probably an increase of wool has thus been obtained. Some say that on the borders of Berkshire the Berkshire Nott was also used, and others contend, although without proof, that a dip of the Leicester has been infused. Be this as it may, there is no doubt that, although for some years past the Hampshire sheep have, for the most part, been kept pure, yet they have been very extensively crossed with other breeds before this period.

We cannot do better than let Mr. Twyman speak for himself on a matter on which he has bestowed considerable attention during a period of ten or twelve years. In a paper he has recently read before a Farmers' Club—after some observations on the respective merits of the Cotswold, the Leicester, the Southdown, and the Old Wiltshire, or Hampshire, from all which sources the present breed is derived—he states his idea was to blend these various breeds together, which he did by using the improved Cotswold ram (Cotswold and Leicester) with the Hampshire Down ewe. 'As a proof of the value of the cross, he observes,—“I have the written documents of the feeder of one hundred tegs sold in 1836, the wool and carcases from which returned 400l.” By using this cross an earlier maturity is gained than by either breed separately. He observes:—“The Leicester and Cotswold will become large, heavy and fat on the outside, but not inwardly, as yearlings; very few Downs will at that age be sufficiently advanced for slaughtering, from their known disposition to arrive more slowly at maturity.” What, then, is wanted is young sheep, large, heavy, and well furnished at a year or fourteen months old, and this object is attained by the cross, as the testimony of the butchers who bought the sheep will show. He continues,—

“You must have observed an immense improvement in the character of the Hampshire sheep generally within the last fifteen or twenty years—an increase of size, a heavier fleece of a longer staple, with a kindlier touch, evidencing a greater aptitude to fatten. I have had my attention called to this fact frequently since I have ceased to be a breeder. How has this altered character been ob-

* It is, we believe, generally acknowledged that the Cotswold sheep have been improved by crosses from the Leicester ram; and although the origin of the latter is involved in some obscurity, yet it is generally supposed that Bakewell, the founder, whilst he used the original Leicester or the long-woolled breed, which prevailed mostly in the midland counties, as his foundation, crossed them with various other breeds until he succeeded in establishing the superiority of excellence which he afterwards sought to maintain by pure exclusive breeding.

tained? Can we recognize none of the Cotswold fleece or his more symmetrical proportions? And, when I tell you that, in the years 1835-36 and subsequent years, I sold very many half-bred rams, not only into Hampshire Down flocks generally, but into those of six or eight of our first ram-breeders whose names are at this day to be seen upon my books; when you must be aware that these breeders are in the constant annual habit of selling one to another in this and adjoining counties; I trust I may without presumption lay some little claim to having supplied a portion of the material from which our present flockmasters have worked up a better and more valuable fabric."

It is a curious fact that, whilst the system we have detailed has been followed in Hampshire, a very different plan has been adopted in the neighboring county of Wiltshire. Here the same large, flat-sided, uncouth horned sheep, whose ancestors were its denizens in the days of the Romans, ranged over the Wiltshire Downs, and, indeed, retained possession some years later than in Hampshire. They at length succumbed to the superior qualifications of the Sussex Downs which gradually displaced them, not by crossing them out so much as by being substituted in their place, and thus the imported Sussex became the West Country Down. At length a larger sheep and particularly a larger lamb was demanded, and then the Wiltshire breeders procured rams from Hampshire and greatly improved their flocks in size, and secured larger lambs. Beginning with Sussex ewes, they have increased the size of the frame without materially enlarging the heads, and thus a very valuable breed of sheep has been formed, the Wiltshire Down, whose more perfect symmetry frequently enables their owners to wrest the prizes from the Hampshire men, and to cause the latter, by the rivalry thus induced, to improve the symmetry of their sheep by careful selection. The Wiltshire Down breeders, therefore, began with the Sussex ewe, and crossed with the Hampshire ram, whilst the Hampshire breeders used the original horned ewe and the Sussex ram. The latter, therefore, have less of the South-down than the former, and, though of greater size and producing somewhat larger lambs, have less symmetry.

Mr. Rawlence, whom we have before quoted, informs the writer :

"The original flock from which my present sheep are chiefly descended, was of the Sussex breed and of moderate quality. I commenced by drafting all the small and delicate ewes, and the remainder were crossed with rams of the Hampshire breed. I bred

from their produce for two or three years, and then had another cross with the Hampshire, still continuing to cull defective ewes. After I had obtained considerable size from the infusion of the Hampshire blood, I had recourse to some rams bred by Mr. Humphrey of Chaddleworth, Berks, which were the produce of the biggest and strongest Hampshire ewes by a sheep of Mr. Jonas Webb's. I use my own rams, and I also frequently purchase a few of the best Hampshire ewes I can get, put my own sheep to them and use their lambs. I also put a sheep of Mr. Humphrey's to some of the best of my ewes, and select rams from their produce, thus getting fresh blood without making an entire cross."

Our account of the Hampshire sheep would be by no means complete unless we noticed the sheep of Mr. William Humphrey, of Oak Ash, near Wantage, Berks, specimens from whose flock have so frequently been prize-winners, and their services generally acknowledged by other improvers.

Mr. Humphrey, in a communication to the writer, has furnished the following interesting history of his sheep, which shows that, although they may be correctly designated the Improved Hampshire Downs, they are yet *sui generis* and distinct from any others, and may be considered peculiarly his own :

"About twenty-five years since, in forming my flock, I purchased the best Hampshire or West-Country Down ewes I could meet with ; some of them I obtained from the late Mr. G. Budd, Mr. William Pain, Mr. Digweed, and other eminent breeders, giving 40s. when ordinary ewes were making 33s. to 34s., using the best rams I could get of the same kind until the Oxford show of the Royal Agricultural Society. On examining the different breeds exhibited there I found the Cotswolds were beautiful in form and of great size ; and, on making inquiries as to how they were brought to such perfection, I was informed that a Leicester ram was coupled to some of the largest Cotswold ewes, and the most robust of the produce were selected for use. The thought then struck me that my best plan would be to obtain a first-rate Sussex Down sheep to put to my larger Hampshire Down ewe, both being of the short-woolled breed. I thus determined to try and improve the quality and form of my flesh, still retaining the size and hardihood so necessary for our dirty low lands and cold exposed hills. With this object I wrote to Mr. Jonas Webb to send me one of his best sheep, and he sent me a shearling by his favorite sheep Braham, which made some good stock out of my large ewes. I

went down the next two years, and selected for myself; but the stock did not suit my taste as well as the one he sent me, and I did not use them. I then commissioned him to send me his sheep which obtained the first prize at Liverpool; and from these two sheep, the first and the last, by marking the lambs of each tribe as they fall, then coupling them together at the third and fourth generation, my present flock was made. Not having used any other blood on the male side for more than twenty years, I found some difficulty at first, when putting the first-produce ram to the first-produce ewe, the lambs coming too small to suit my customers. To obviate this difficulty I drafted out the finest and smallest-bred ewes, replacing them with the largest Hampshire Down ewes I could meet with that suited my fancy; still continuing to use the most masculine and robust of my rams to keep up my size. Some of my friends advised me to use a large coarse sheep to these small ewes to remedy the defect; but the larger ewe seemed to me the better way, and that course I pursued. I got rid of my smallest ewes and replaced them with large ones, which gave me what I thought to be an advantage—the using no male animal but of my own blood, the pedigree of which I am now acquainted with for more than twenty years. It has succeeded hitherto beyond what I could have expected. My object has been to produce a Down sheep of large size with good quality of flesh, and possessing sufficient strength and hardiness to retain its condition while exposed in rough and bad weather to consume the root-crops on our cold, dirty hills. Independently of the value of the Hampshire or West-Country Down in an agricultural point of view for such localities as ours, they produce when slaughtered a valuable carcase of mutton, giving the consumer a good proportion of flesh to the fat, which is a point that may be too much lost sight of. I will, in proof of it, relate an instance which a gentleman told me the other day. When residing in another county he sent to his butcher for 3 lbs. of mutton. The fat seemed so much out of proportion to the lean, that he had the curiosity to weigh the lean. After carefully cutting it out, he found it to weigh $\frac{3}{4}$ lb., or only one-fourth of the whole. This anecdote indicates to those who are attempting by crosses to establish a new breed, or to improve an old one, the importance of producing an animal in which the flesh forms a due and sufficient proportion of the whole.”

In Dorsetshire the same system has been pursued as in Wiltshire, although more recently and to much less extent.

In the eastern part of the county the Wiltshire system of crossing has been followed with still greater latitude. The object being to secure size without coarseness, the rams of the Hampshire as well as the Sussex are each used, as the fancy of the breeder may direct. In one flock, well known to the writer, of very good repute—so much so, that an annual sale of rams and ram lambs takes place, and for several years past has been very successful—the owner, whose flock was originally Southdown, has increased the size of his sheep by means of the Hampshire ram, but does not hesitate to avail himself of the Sussex from time to time to counteract, as he says, any tendency to sourness, and also uses the choicest of his own breed as well. Here is an evident cross, carried to a considerable extent and with great success, as the high price realized by the sale of fat tegs sufficiently testifies. Other breeders in this county adhere firmly to the Southdown, which they seek to improve by using first-class rams; and the superior quality of their fleece, as compared with the Hampshire, forms no small part of their motives for so doing. Some years since the Southdown sheep in Dorsetshire received a cross from the Devon or Bampton Nott, a large long-woolled sheep, but with a good disposition to fatten. The cross was approved of, and the produce were used by other flock-masters, which circumstance has perhaps rendered the Dorsetshire Southdown somewhat larger than the Sussex.

The *Dorset horned* sheep, so valuable for their early lambs, some fifty or sixty years since reigned supreme over the Dorsetshire Downs. They were then in many instances supplanted by the Sussex, which were found better suited for folding, and were more esteemed for their mutton. Crossing was tried in many instances, but although the half-bred lamb from the Dorset ewe was and still is in great request for early lamb, yet the breeds did not assimilate well; they were as a flock inferior to their parents, and were consequently discontinued; and whilst the Dorset held their own in the west, the Southdown took their place in the eastern part of the county, and of late years have, in many instances, been crossed by the Hampshire ram.

The Dorset horned sheep is, however, a much superior animal to the old Wiltshire and Hampshire. Shorter on the legs, with a more compact frame and a rounder barrel, this sheep, besides its peculiar value for the production of early lamb and its remarkably prolific qualities, is by no means to be despised for its feeding properties. It is not unusual for these sheep—as well as the kindred

though somewhat larger Somersetshire—to be brought into market in March and April, together with their lambs and sometimes pairs of lambs, all fit for the butcher at the same time. The Dorsetshire and Somersetshire sheep are raised on tolerably good land, where they have been preserved pure and improved by selection.* It is usual, however, to put the ewes that are intended to be sold to the Southdown ram, which improves the quality and fattening disposition of the lamb, and the ewes are usually sold at the Hampshire October fairs, by which time they are very forward in lamb. The buyers of the ewes, although the usual custom is to sell off the ewe and lamb the following spring, sometimes keep a portion of the ewes another year, putting them again to a black-faced ram. It is remarkable that these ewes are not only exceedingly prolific and rarely have any mishap in yeanning their lambs, but will carry on all the functions of maternity whilst almost fat themselves. In South Hampshire, which is celebrated for the excellent quality of its early lamb, this system is carried out to perfection, particularly with the Somersetshire ewe. The drawback to this breed of sheep, as compared with the Hampshire and Southdown, is the longer period required for their maturity, the richer food required, and the somewhat inferior character both of the mutton and the wool.

To return, however, to our proper subject, we may observe that various attempts were made some years since to introduce the Merino blood, with the idea that great benefit would be derived from the increased quantity and the superior fineness of the wool; and undoubtedly, if the carcase of the Southdown and the wool of the Merino could be united in the same animal, the acmé of sheep-breeding would be attained. It was found, however, that the quality of the wool was not a sufficient recompense for the want of early maturity and feeding properties; and at length, after many trials, the Merinos disappeared by the continued use of other rams. It is very possible, however, that they may have left behind them some improvement of the fleece, for it is equally difficult in breeding to get rid of a virtue and to wash out a stain. We have confined our examples of cross breeding pretty much to the breeds of our own locality, but it must not be forgotten that other counties have also some noble specimens of cross-bred sheep. Shropshire is

* The Dorsetshire flocks have of late years been crossed and improved by the larger Somersets, so that pure flocks of the former are now rare, and the distinction of the two breeds by the color of the nose has almost disappeared.

celebrated for its breed of sheep, and under the new regulations they compete very successfully at our annual shows. At the Chester meeting they beat the Hampshire Down as old sheep, but in their turn were conquered by the latter in the younger classes. They present themselves to our notice in a more compact form ; though shorter, they are wider, broader on the back and deeper through the heart.

This breed was first brought into national repute at the Shrewsbury meeting in 1845, when it was wisely held that it was no longer desirable to confine the honors of the Society to a few particular breeds. The new class "Shortwools not Southdowns," brought into competition with each other, the Hampshire, the Shropshire, and the West Country Down or Wiltshire ; and thus, although the labors of the judges were rendered somewhat onerous, yet much good was effected, and the public have greatly appreciated and promoted the various breeds so brought into notice.

The Shropshire originally sprang from a breed called the Morfe Common sheep, and owe most of their great and improved qualities to careful selection. We imagine they would make a very good cross with the Hampshire Down, and might somewhat improve the carcase of the latter, as well as the quantity and quality of wool in the flocks of those breeders who do not attach too much importance to the color of the face.

The Shropshire speckled-faced sheep is undoubtedly a cross-bred animal, and indeed affords a striking example of the perfection that can be derived by a judicious mixture of various breeds. At a late meeting of a Farmers' Club in this county, Mr. J. Meire observed, "It is not attempted to be denied that the Shropshire is a cross-bred sheep ; the original breed was horned, and the first attempt at improvement was to get rid of these incumbrances, and there is little doubt that this was effected by a cross of the Southdown. This sheep was well adapted for the downs, but for the enclosures of Shropshire something more docile was required, consequently, recourse was had to the Leicester." This crossing and recrossing at length gave place to the practice of careful selection, and thus uniformity was sought for and attained, and the present superior breed was established. It is now held that no further cross is required.

The New Oxfordshire sheep is a very valuable breed, originating from a cross between the improved Cotswold and the Hampshire or West Country Down. Their size being less than the Cotswold,

they are better adapted for the ordinary management of a light land farm. This breed is very similar to that first introduced by Mr. Twyman, to which allusion has been made, but probably the Southdown has been used as well as the Hampshire Down.

Although Mr. Twyman may perhaps have a claim to priority in crossing the Hampshire Down ewe with the Cotswold ram, yet from various causes, and probably because the Hampshire hills were scarcely adapted for such large sheep, they failed to establish themselves in this locality; whilst a very few years afterwards a similar experiment was tried in Oxfordshire, and, whether from a milder climate, more fertile pasturage, or other causes, the result was a complete success.

Mr. S. Druce, of Eynsham, Oxon., favors the writer with the following short communication on the subject:

"The foundation of this class of sheep was begun about the year 1833 (see vol. xiv, p. 211,* of the Journal of the R. A. S. E.), by using a well-made and neat Cotswold ram with Hampshire Down ewes. At the same period several breeders of sheep in this neighborhood also tried the experiment; consequently there has always been an opportunity of getting fresh blood by selecting sheep which suited different flocks, and thereby maintaining the uniform character which is now established.

"As to the result of this crossing, I would refer you to the names of the following, who usually exhibit at the "Smithfield Club" Show, viz: Messrs. John Hitchman, Little Milton, Oxon.; Wm. Gillett, Brize Norton, Witney, Oxon.; W. Hobbs, Minsey Hampton, Gloucestershire; A. Edmunds, Longworth, Berks; J. B. Twitchell, Wilby, Northamptonshire; C. Howard, Biddenham, Beds; William Hemming, of Caldecot, near Moreton-in-the-Marsh, Gloucestershire, &c., &c. And amongst ram breeders I would name J. Hitchman, J. Roberts, C. Gillett, W. Gillett, J. Bryan, His Grace the Duke of Marlborough, H. L. Gaskell, Esq., H. Barnett, Esq., all in this neighborhood, and who offer sheep by auction the second Wednesday in August annually at Oxford."

* In the communication referred to, Mr. Druce gives a table, showing his ideas of the comparative value of the different breeds of sheep, the result of which is in favor of the cross-bred. He adds, "With ordinary skill in sheep-farming, I find no difficulty in keeping the form and size of the animal as it should be; the wool of a valuable quality, and not deficient in quantity; and I maintain that the good qualities can be better secured by employing the cross-bred animals on both sides than by confining the practice to the first cross."

There are few districts in England in which some advantage has not been derived from the cross breeding of sheep. Even the little *mountain sheep* of Wales has been greatly improved by the *Cheviot* ram, a larger, superior, but still a mountain sheep. At the same time the Cheviots themselves have been improved for the butcher by crosses with the Leicester, the Cotswold, and the Down. The progeny have been increased in size, and fattened more readily. This breed has also been considerably improved by selection.

The *black-faced heath* breed, too, so well suited to mountainous districts in which heath abounds, whilst it has been supplanted in certain districts by the Cheviot, has, in other heathy localities, displaced the latter. Although very slow in reaching maturity, the mutton is much esteemed; and the lambs, from a first cross with the Leicester ram, fatten readily when removed to more favorable pasturage than the native habitat of the breed.

The testimony in favor of the advantages to be derived from the cross breeding of sheep when the purpose sought for is limited to the first cross is so strong that, however forcible may be the arguments of the advocates of pure breeding with reference to stock sheep, they sink altogether in weight when sheep for the butcher are concerned. We have noticed the advantageous custom of crossing the Dorset and Somersetshire ewes with the Down ram, thereby improving both the quality and the disposition to fatten of the lambs, whilst the early lambing and nursing qualities of the ewes are equally secured.

In Norfolk an intelligent and experienced correspondent assures us that cross breeding is of the utmost importance to the light land farmers, and that the crosses most esteemed are the Southdown and the Hampshire ewes crossed with the Leicester and the Cotswold ram, by which earlier maturity is secured, together with an increase both of wool and mutton. The cross between two comparatively pure breeds is most esteemed. Most of the graziers in the locality of the writer (Mr. Coleman) speak strongly in favor of the first cross, as possessing both early maturity and a propensity to fatten. The inconvenience of the system is the necessity induced either of selling out every year, or otherwise of keeping up a pure flock, in order to afford materials for crossing. It may be observed that although generally, for the purposes of the butcher, a ram of a large breed is necessary, this is not essential when a permanent improvement is sought for; improved shape and superior quality often follow the ram of a smaller breed. Many owners of

sheep, whose flocks were originally cross-bred, declaim very forcibly on the evils of crossing and the necessity of pure breeding.

We cannot do better, in concluding our paper, than gather up and arrange in a collected form the various points of our subject, which appear to be of sufficient importance to be again presented to the attention of our readers. We think, therefore, we are justified in coming to the conclusions :

1st. That there is a direct pecuniary advantage in judicious cross breeding ; that increased size, a disposition to fatten, and early maturity are thereby induced.

2nd. That whilst this may be caused for the most part by the very fact of crossing, yet it is principally due to the superior influence of the male over the size and external appearance of the offspring ; so that it is desirable, for the purposes of the butcher, that the male should be of a larger frame than the female, and should excel in those peculiarities we are desirous of reproducing. Let it be here, however, repeated as an exceptional truth, that though as a rule the male parent influences mostly the size and external form, and the female parent the constitution, general health, and vital powers, yet that the opposite result sometimes takes place.

3d. Certain peculiarities may be imparted to a breed by a single cross. Thus, the ponies of the New Forest exhibit characteristics of blood, although it is many years since a thorough-bred horse was turned into the forest for the purpose. So, likewise, we observe in the Hampshire sheep the Roman nose and large heads which formed so strong a feature in their maternal ancestors, although successive crosses of the Southdown were employed to change the character of the breed.

It has been asserted by some observers, that when a female breeds successively from several different males, the offspring often bear a strong resemblance to the first male ; which is supposed to arise from certain impressions made on the imagination or nervous system of the female. Although this is sometimes or often the case, we doubt very much whether it is so frequent as to be considered as a rule.

4th. Although in the crossing of sheep for the purpose of the butcher, it is generally advisable to use males of a larger breed, provided they possess a disposition to fatten, yet, in such cases, it is of importance that the *pelvis* of the female should be wide and capacious, so that no injury should arise in lambing, in consequence of the increased size of the heads of the lambs. The shape of the

ram's head should be studied for the same reason. In crossing, however, for the purpose of establishing a new breed, the size of the male must give way to other more important considerations; although it will still be desirable to use a large female of the breed which we seek to improve. Thus the Southdowns have vastly improved the larger Hampshires, and the Leicester the huge Lincolns and the Cotswolds.

5th. Although the benefits are most evident in the first cross, after which, from pairing the cross-bred animals, the defects of one breed or the other, or the incongruities of both, are perpetually breaking out, yet, unless the characteristics and conformation of the two breeds are altogether averse to each other, nature opposes no barrier to their successful admixture; so that, in course of time, by the aid of selection and careful weeding, it is practicable to establish a new breed altogether. This, in fact, has been the history of our principal breeds. The Leicester was notoriously a cross of various breeds in the first instance, although the sources which supplied the cross is a secret buried in the "tomb of the Capulets." The Cotswold has been crossed and improved by the Leicester; the Lincoln, and indeed all the long-woolled breed, have been similarly treated. Most of the mountain breeds have received a dash of better blood, and the short-woolled sheep have been also generally so served. The Hampshire and the present Wiltshire Downs have been extensively crossed; the friends of the Shropshire cannot deny the "soft impeachment"; and the old black-faced Norfolks have been pretty well crossed out altogether. The Dorsets and Somersets remain pure as a breed, although they are continually crossed to improve their lambs. The Southdown is perhaps one of the purest breeds we have. No one asserts that the immense improvement of this breed by Ellman was due to any crossing; whether the increased size and further improvement which it has received in other counties have been effected in all cases without a cross of any kind, may be in the minds of some a matter of doubt; yet it is only right to give the arraigned, in the absence of any proof to the contrary, the benefit of such doubt, and consider them still as pure as ever.

We confess that we cannot entirely admit either of the antagonistic doctrines held by the rival advocates of crossing and pure breeding. The public have reason to be grateful to the exertions of either party; and still more have they respectively reason to be grateful to each other. We have seen that Mr. Humphrey cheer-

fully acknowledges the benefit he derived from Mr. Jonas Webb's rams. Had he grudged the expense of seeking his improvements from such a renowned flock, and been satisfied with inferior rams, he would not have achieved the success which has crowned his exertions. So likewise with the new Oxfordshire breed. What matters it whether the localities occupied by these sheep were divided between their ancestral breeds or occupied as now by their cross-bred descendants: the public is benefited by having better mutton than the Cotswold alone would furnish, and more valuable wool than the Downs could supply; whilst the breeders, finding their account in their balance-sheet, have very properly perpetuated the breed which has paid so well. Our purpose has been to hold the scales fairly between both systems, having no prejudices to serve. Thus, in defending the system of crossing from some of the objections that have been urged against it, we have no wish to be thought forgetful of the merits of a pure breed; on the contrary, we would instance with pleasure the remarkable success that has attended the careful selections which in the hands of Mr. Merson, of Brinsworthy, near North Molton, Devon, has brought out the capabilities of the little Exmoor sheep to an amount of excellence which no inspector of the ordinary breed would have believed them capable of attaining. But whilst this instance proves how much can be done by careful selection, vigorous weeding and pure breeding, and conveys a warning to any rash and heedless practitioner of crossing, yet, if we regard it as a bar against the system, we deprive by anticipation the spirited introducer of this great improvement of the fair reward for his labors which he has a reasonable prospect of obtaining from the proprietors and improvers of other mountain-breeds.

Although the term *mongrel* is probably correct as referring to a mixed breed, yet, as it is generally used as a term of reproach, it should not be fairly applied to those recognized breeds which, however mixed or mongrel might have been their origin, have yet by vigilance and skill become in the course of years almost as marked and vigorous and distinctive as the Anglo-Saxon race itself, whose name we are proud to bear, and whose mixed ancestry no one is anxious to deny.

Let us conclude by repeating the advice that, when equal advantages can be attained by keeping a pure breed of sheep, such pure breed should unquestionably be preferred; and that, although crossing for the purposes of the butcher may be practiced with im-

punity, and even with advantage, yet no one should do so for the purpose of establishing a new breed, unless he has clear and well-defined views of the object he seeks to accomplish, and has duly studied the principles on which it can be carried out, and is determined to bestow for the space of half a lifetime his constant and unremitting attention to the discovery and removal of defects.

ON CROSS-BREEDING IN HORSES.

Some time since I discussed the subject of cross-breeding in the pages of this Journal, vol. xx., with more particular reference to the breeding of sheep; my paper excited some little attention, and I had no reason to complain of the criticism it received. In the meantime, I have seen no cause to doubt the truth of the principles then advocated, or the facts adduced in their support. I propose, therefore, at the present time, to show the applicability of those principles to the horse, more particularly to the saddle-horse, and I hope to illustrate this branch of the subject with equally strong examples. Among the points I sought to establish were the following: That the influence of the male or female parent is not capricious; but yet not always alike; in the majority of instances the male parent governs the size and external shape of the offspring (particularly in the back and hind-quarters), whilst the female influences the constitution, the nervous system, and often the head and fore-quarters—the case being, however, occasionally reversed. That this combination, which may be more of a mechanical than a chemical union, by no means implies such an equal division of influence, as the mingling of two fluids, in which case the offspring would be unlike either parent, but a *juste milieu* between the two, and there could be no handing down of type from one generation to another. It is rather such a fusion of two bodies into one that both defects and high qualifications are passed on from parent to offspring with a sort of regular irregularity, resembling the waves of the sea—each parent having the remarkable power of propagating ancestral peculiarities, though latent in itself. Thus it is that strong characteristics are handed from one generation to another; so that if we seek by careful selection to remove a defect or propagate a good quality, we may calculate that a large number, perhaps the majority of the offspring, will meet our wishes, and by weeding out the remainder and pursuing this course for several generations we

may accomplish our design. This view will further explain how it is that defects not seen in the first cross, being kept down as it were by the superior influence of the improving parent, re-appear in the next generation, and serve to deter timid breeders from continuing the experiment, or arm the opponents of crossing with strong but fallacious arguments against going beyond the first cross.

I pointed out that, owing to the superior influence of the male parent, the effect of the first cross in sheep was very considerable, bringing greater size, often longer wool, earlier maturity, and a propensity to fatten ; or, in other cases, superior quality of mutton. Many persons who go thus far are deterred from going any farther by the very numerous failures which result from pairing together animals of the first cross, and consider that pure breeds only should be perpetuated ; I adduced, however, various examples to show that crossing might be carried much farther, even to the extent of establishing altogether a new breed, possessing qualifications which, although derived from them, yet neither of the parent breeds alone exhibited. I instanced the cases of the Improved Hampshire, the New Oxfordshire, and the Shropshire, and more particularly the flocks of Mr. Humphrey, as affording successful illustrations of the practice.

Special reference was made to Mr. Humphrey, who, starting with two of Mr. Jonas Webb's best prize Southdown rams, kept steadily to sires of his own stock, occasionally purchasing fresh Hampshire ewes, until in the course of 20 years he had established a first-rate breed, all of which were descended on one side from Mr. Jonas Webb's Southdowns. This example, as well as that of Mr. Rawlence of Wilton, who now scarcely ranks second to Mr. Humphrey, seems to show that the use of males and females possessing a similar amount of breeding is much more to be depended on than the system pursued by others who cross with the Sussex when their sheep are getting too strong or coarse, and with the old Hampshire when they are getting too small.

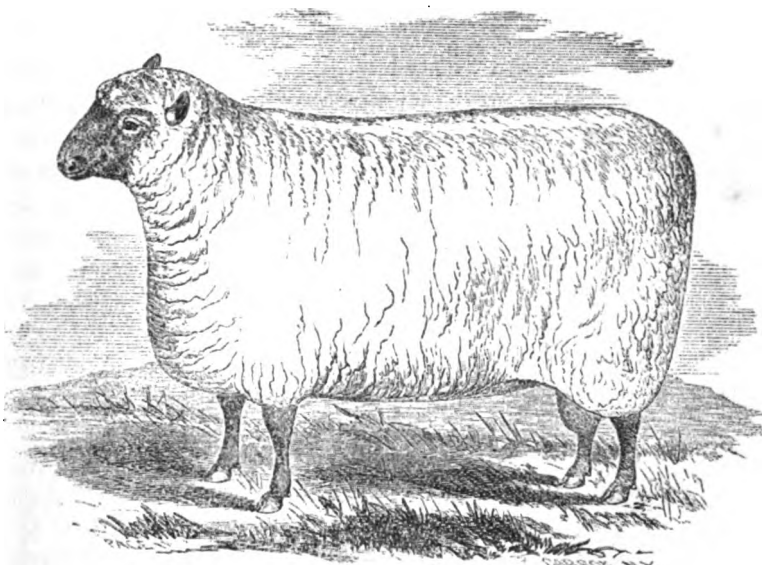
I now further propose to inquire whether this system, which is so successful with sheep, is one altogether to be condemned with *horses* ; always assuming that cross-breeding, to be successful, must be undertaken with a distinct and defined object, and assigning the highest praise and the first rank to those who maintain intact the purity of our best established breeds.

An opinion is very commonly entertained that there are only two pure breeds of horses in this country (ponies excepted), viz :



SOUTH DOWN EWES.

The property of H. G. White, South Framlingham, Mass.



SOUTH DOWN RAM, "SON OF ARCHBISHOP."

The property of H. G. White, South Framlingham, Mass. Son of Archbishop was winner of the first prize as two-year-old, at the show of the New England Agricultural Society, at Concord, N. H., in Sept., 1865. Sire, "Archbishop," bred by the late Jonas Webb, Exmouth, England, and imported by Samuel Thorne, Dutchess County, New York. Dam, an imported Welsh ewe by "Reserve."

the thorough-bred and the heavy cart-horse,—all the rest being but modifications of these races in various degrees. It is, however, probable that long before either of these extremes were known among us there existed a native breed of a very useful kind, pure examples of which are now scarcely to be met with. The *pack-horse* with his drooping hind-quarters, good shoulders, strong fore-legs, and sure action, existed in England for centuries before the Barb and the Arab were imported for the chase or the race-course by the Stuarts, or the introduction of carriages had led to the use of Flanders mares, brought from the neighboring continent; these heavy horses, with their high action, slow but sure and staunch, being naturally much prized for helping the ponderous coach out of the deep ruts of the high roads or along the miry lanes. The heaviest of the race were greatly in demand not only for tilling the strong lands but for drawing the cumbersome road-wagon before even the six-mile-an-hour luggage-van was introduced as a novelty and an innovation. I have before me one of Morland's striking sketches which reminds me forcibly of my boyish days, when the slow but sure approach of one of these ponderous vehicles with its eight or twelve ton load, heralded perhaps by a cloud of dust ever stirred up by the heavy feet of the ten or twelve massive animals that moved it onward at the rate of some two miles an hour, never failed to command attention. It was a sight to behold these leviathans settle into their work after a short respite in the midst of a steep hill: the burly wagoner, too heavy to walk, and scorning to ride in his wagon, was mounted on one of those strong sure-footed ponies, usually white or pie-bald, which have long since disappeared. A crack from his long whip would send into the collar with a 20-horse power the ten hairy-legged but powerful brutes whose broad backs were rendered still broader in appearance by the absence of tails, for each horse was docked close to the stump, under the absurd idea that their strength would thereby be increased.

It is difficult to imagine that this wagon, which seemed to the people of the day to be one of the institutions of the country, was itself formerly looked on as a newfangled novelty, which superseded the once universal, now well-nigh forgotten pack-horse.

There are but few specimens remaining of the pure pack-horse breed which has been quite neglected and overlooked by agricultural societies; and, consequently, whilst the mares have for a while proved valuable for breeding half-bred hunters with the thorough-

bred horse, the males have been gelded and used up. This original or ancient race has no doubt been modified considerably in size, according to the fertility of the soil on which it might be raised; being sometimes developed into the strong upstanding harness-horse, and at others dwindling down to the plain but useful galloway, as seen in many remote districts, and particularly in the little horses used in the Irish cars. The Welsh pony and the Clydesdale cart-horse, the latter enlarged by rich pasturage and perhaps a cross, probably represent the opposite extremes of this same breed.

In less civilized ages the most useful horse was that which could most readily be adapted to all purposes; and there is no good reason why, even in modern days, the more ancient breed, equally pure and more serviceable than the blood-horse or dray-horse, should be altogether neglected, not only by our sporting men, but by the patrons of our agricultural societies; particularly since magnificent hunters have been the result of the cross between the thorough-bred horse and the old pack-horse mare. It will be useful to point out the peculiarities which distinguish the two breeds, with a few explanatory remarks on the component parts of the animal which by their varying proportions constitute these peculiarities.

The skeleton is formed of bone, which owes its solidity to the fact that it is composed of one-half or upwards of earthy matter, so deposited in cartilaginous cells as to render the bones strong and resisting, and adapted not only to support the weight of the animal, and to protect from injury the vital organs, but to serve as a framework for the attachment of muscles, sinews and ligaments. The bones of the limbs are for the most part cylindrical, and motion is effected by means of joints at the extremities of the bones, which are secured by powerful non-elastic ligaments. The bones are much smaller in the thorough-bred than in the cart and intermediate breeds, though generally more compact, and the joints also are by no means so wide, but admit of more longitudinal motion. With this diminished size there is, of course, less surface to sustain the weight of the body.

The sinews resemble the ligaments in appearance, and like them are non-elastic; they are attached to the bones, and serve to communicate motion to them from the muscles to which they are joined or from which they appear to spring. Both ligaments and sinews are smaller in the thorough-bred than in other horses. The

muscles and the flesh are the same, and are the seat of the motive power, motion being produced by the contraction of the fibres of which the muscles are composed. The strength is the result both of the size and the number of fibres, whilst the extent of motion depends on the length of the muscles and their fibres. Of course the length of the bones corresponds to that of the muscles, and although the joints in the thorough-bred have less surface, they admit of more motion.

The pack-horse may be thus described :—The prevailing colors of the breed were bay and brown, which, with the usual accompaniments of black legs, denoted a good and hardy constitution, yet other colors, such as greys and blacks, were to be found occasionally. Among the chief peculiarities were the good and flat fore-leg with its well-developed back sinew or flexor tendon, the good and sound foot, and capital shoulders and fore-hand. The neck muscular but not thick and heavy, was fairly arched, and the head, of moderate size, was well set on. This form was accompanied, as we might expect, with good and safe action in the walk and trot; the horse rarely stumbled, and only fell from overwork and exhaustion. While the heavier and coarser specimen of this breed was capable of carrying his five-hundredweight load throughout a long journey, the lighter and more active was used as the ordinary saddle-horse or even as the hunter of the day. Many of these animals were extraordinary trotters, and, as good trotters are generally good walkers likewise, the quality was greatly prized and encouraged; and thus a race of trotters was bred which, no doubt, were the ancestors of the celebrated American trotting-horses, such as the "Tom Thumbs" of later days. Although these horses were deep in the chest and ribs, the hips were often ragged, the tail set on low, and sometimes the hocks were rather too straight. The celebrated trotting-horses of Norfolk were evidently not true pack-horses, although perhaps allied to them; they had, no doubt, a touch of Spanish blood, and possibly of the thorough-bred.

Let us now, as a contrast, glance at the peculiarities of the thorough-bred horse. Racing, no doubt, existed in this country long before, but received a new impetus from the introduction of the Barb, the Arabian, and the Turk. The sires which were at first imported, quickly established the great superiority of the Eastern blood as regards speed, and when mares followed at a later date in

smaller numbers, they no doubt still further added to the speed of the English racehorse.

The modern blood-horse is of much greater average size than the Arab or the Barb either of the present or the past; and a doubt exists whether this is entirely due to selection and nurture, or in part to the early crossing with the native mare; in any case, it cannot be denied that every thorough-bred horse in the kingdom, from the highest to the lowest, is to the extent of more than nineteen-twentieths descended from the Eastern horse. This foreign influence was not, however, derived from one strain only, for the pedigree of 'Eclipse' himself shows that besides his descent from the Darby *Arabian* and Godolphin *Barb*, he had five or six crosses of the *Turk*; and we have a strong conviction that the improved native horse, made up of the ancient British, the Spanish, and the Barb, is entitled to some share in the honors of his parentage. Be this as it may, the present English thorough-bred horse has proved himself faster than any of the breeds from which he is sprung; and although many doubts have been cast of late on his powers of endurance in comparison with the smaller horse of some fifty years ago; and the practice of training and racing has been severely criticised, yet there is good reason to suppose that our first-class winners are as stout as most of those which have preceded them.

The thorough-bred English horse, in common with the Arabian, possesses no doubt more muscular vigor, as well as nervous energy, than other kind of horse.* In addition to this he has a deep chest capable of admitting the large amount of air which the demands of the system require under severe exertion. By natural conformation and by artificial training all superfluous weight is removed, and thus he is capable of covering more ground in his stride, and

* From time to time it has been suggested, with the view of improving our breed of thorough-bred horses, and particularly their staying qualities, to resort again to the original or parent breeds; but not to mention the ill-success of such attempts when made, it must be evident that the tendency of this cross would be to diminish the size and to shorten the stride, and probably to render the action too high; we can therefore scarcely expect breeders for the turf to adopt the advice. At the same time it must be acknowledged that the Arab has been more successful with half-bred and under-bred mares than the third class cast-off racer, inasmuch as with undeniable bottom there has been a hardier constitution, better forelegs, and higher action from this cross. Where the dam has been of sufficient bone and size, many good hunters and handsome harness-horses have been so bred, and still more frequently capital ponies and galloways; indeed, this is one of the best modes of improving the breed of ponies. Arabs have, in proportion to their size and weight, larger bone and sinew than the majority of our thorough-breeds, and I have often observed their beneficial influence in the second and third generation both with hunters and other horses.

of repeating these strides more frequently than any other horse, as well as of continuing his extreme efforts for a longer period without tiring. The heart and the brain of such a horse are comparatively larger than in other breeds, the bones, though smaller, are more compact, the skin of a thinner and finer texture, and the blood-vessels more developed. These advantages, however, are not without certain drawbacks. The delicacy of the skin causes the animal to be extremely susceptible of cold; he is consequently less hardy and requires more food to keep up the animal temperature, so that is difficult to keep flesh on a thorough-bred horse unless he is kept warm; moreover, the carcass being smaller, the stomach and intestines are not so large, and consequently the food must be more concentrated and nutritious to keep up this supply of warmth.

The difference as respects hardiness is strikingly shown between the foal of the cart-mare and the thorough-bred. Whilst the former is strong, sturdy, and fleshy, the latter is comparatively puny, thin, and susceptible of the least cold; the former, by means of the dam's milk, can be kept in first-rate order, whilst the latter requires artificial assistance as soon as it can be rendered. The fact is that the digestive apparatus is more powerful in the one than in the other—it can assimilate more nutriment from nutritious food, and subsist on rough diet on which the other would starve. This it is which renders it so expensive to rear the blood-colt, and this distinction prevails throughout life, and extends in a lesser degree to the half-bred, as compared with the cart-horse. The thorough-bred horse has yet other faults; as a rule, he is slighter and weaker in the fore-legs, he goes closer to the ground, is often a bad walker and indifferent trotter, and is more liable to stumble and fall than the coarse-bred horse. How can it be otherwise? He is bred to win a race, from parents who have been winners; the elevated and rounded action that makes a good hack or charger, would shorten his stride and impair his chances; although if he has good legs and sufficient size and substance, the very fact of his being too slow for racing ought to be rather a recommendation as a hunting stallion than otherwise, yet who would give him credit for stoutness if he had never been fortunate enough to win a race; or what chance would he have for a prize at our agricultural shows when judged by those who can recognize at a glance a Derby favorite, or the winner of the St. Leger?

The term *stoutness* in racing phraseology means endurance con-

nected with speed ; it has nothing to do with size and weight, as a tyro might suppose ; a great horse is often speedy but a craven at heart, while most of the stoutest race-horses of the last century were little more than gallows in size, and such too are the untiring Arabs of the Desert. No judge, therefore, can tell a stout horse by his appearance—it is necessary to know his performances before this can be determined ; for, however perfect the symmetry and powerful the frame, if he is only good for a mile he is not stout.

The improvement effected in the size and probably in the speed of the thorough-bred horse is no doubt very great, and every year produces some wonderful examples of first-class winners ; yet I will venture to say that nowhere else throughout Nature where the same care and vigilance is bestowed on the rearing of animals, are the blanks so many and the prizes so few. To justify this perhaps startling assertion, let us endeavor to trace the career of the, say, fifteen hundred or more thorough-bred foals which are annually dropped. These foals are reared from mares of undeniable pedigree, and for the most part of good size, very many among them being winners. The majority are begotten by first-class horses, who have either been great winners themselves or have beat great winners before they have themselves broken down, or, better still, have proved themselves the sires of great winners as well as winners themselves. Both care and expense are lavishly bestowed on the fifty or sixty sires, the two thousand brood mares, and also on the foals themselves as soon as they are dropped. The dam's milk is sustained with the most nutritious food, and the foal is fed with the best as soon as it can masticate. It is an error to suppose that either the mare or the foal is pampered or enervated by undue care ; the well-kept paddock affords every facility for taking exercise, and those who have witnessed the sprightly and incessant gambols of the young animal will acknowledge that the muscles and sinews of the thorough-bred foal are called into play much more than those of the cart-horse. Yet, with all this care, what becomes of these costly toys ? The greater number go into training at two years old or earlier, no small percentage having previously disappeared from disease or accident, and very many succumb to the numerous maladies and mishaps that occur in the training stable. After this ordeal the trials begin ; and then some are condemned as too slow and others as too small, some are mercifully shot out of the way, others submitted to the auctioneer's hammer, and many

a colt that has cost £200 to rear is sold for less than £10, and perhaps is dear at the price. The majority thus sold are colts and fillies that have never raced, many have given way in the joints or sinews, while some are rejected for their shortcomings in the actual race as two year olds, although many a horse which was unsuccessful at that age has proved a prize winner afterwards. It is difficult to say how many of those foaled actually make their appearance on the race course, but the difference in numbers between the entries and the starters for the Derby will afford some slight criterion. At all events, a little reflection will satisfy us that the number of first-class, or even second-class, horses annually brought to maturity is very small, and justify our assertion that the blanks far outnumber the prizes.

How can we explain such a falling off, that the offspring probably to the extent of 70 per cent., should prove inferior to both the sire and dam? The answer may be found in the fact that although our first-class race-horses are large and powerful animals, yet they are descended from ancestors considerably smaller than themselves, and Nature makes a constant effort to return to the original type. But for this natural law there is no telling what size our thoroughbred horses might reach, for the constant effort of the breeder is to raise large colts, and it is almost an axiom with many men that although a good *little* horse is all very well, a good *big* horse is a great deal better. In fact, the little horses, which are sometimes greater winners, are rather low than small, and usually have considerable length of muscle as well as depth of chest and substance, to compensate for their want of height. When, therefore, there are such constant efforts to outstep Nature, we cannot wonder that failure should be so frequent a result.

There is a striking contrast between Derby horses and their numerous relations who figure at country races, and when the short racing-career of these large colts is over and they are devoted to the stud it is astonishing how large they become and how much they girth.* They look the very incarnation of vigor and of strength, and it is probably their look that induces so many

* Although as a rule half-bred and three-parts-bred horses have more bone, and are larger in the girth than thorough-breds, yet the latter increase surprisingly in girth when thrown out of training and devoted to the stud. My friend Mr. Barrow, Veterinary Surgeon, of Newmarket, has kindly furnished me with the measurements of a number of first-class stud-horses now under his care at Newmarket. Amongst others "Longbow," "Toxophilite," "Thunderbolt," and "Muscovite," all of whom were upwards of

breeders to think that from such a sire any amount of substance can be secured which can reasonably be expected in the weight-carrying hunter. They forget, however, how large a percentage of their progeny are but "weeds," even when these sires are put to picked thorough-bred mares; and how very rarely the services of a horse of this stamp can be secured for half-bred mares. The great bulk of travelling thorough-bred stallions must necessarily be third-class horses, long in the carcass, long in the legs, weak in the sinews, unfit for any other purpose than the stud; and such are the horses that assist in deteriorating our breed of saddle-horses, and render horse-breeding so frequently unprofitable.

Let it not, however, be supposed that I undervalue the importance of "blood" in the hunter, the hack, and the harness-horse; I only dispute the doctrine that we should rely mainly or solely on the sire for its introduction, and then only for the first cross. It is a well-established fact, that the Eastern blood amalgamates with the native breeds of the country extremely well; it can be traced in the form, and still more in the courage and endurance, even in the third and fourth generation.

I must now call attention to the general principles of cross-breeding, viz., that while the male governs the size (not mere height,) the vital functions and the nervous system are influenced most by the female. If there be any truth in this doctrine, it must be as essential to attend to the pedigree of the mares as to that of the sire. But here all is left to chance; and whether she is taken from the plough-tail, the van, or the omnibus, no matter, so long as the sire is thorough-bred. Let us consider how the system works on some of our best mares. A farmer has a valuable mare that has been tested by many an arduous run. She is by a thorough-bred horse out of a half-bred mare, and, valuable as she is, she is a shade too light, or, at any rate, would be worth more money if she were equal to a little more weight. He is induced to put her to a thorough-bred horse, and the progeny is, of course, seven-eighths thorough-bred, but, according to my experience, mostly an unprofitable weed. We might go a step further back,

16 hands, and exceeded 6 feet in girth, and measured on the average 8 inches round between the knee and the fetlock. The chest of the thorough-bred is always comparatively deep and capacious. Mr. Barrow considers that the capacity of the chest increases after serving mares and from wearing no rollers, or anything to interfere with the proper expansion of the chest. It must be borne in mind that the horses here mentioned are peers of their order.

to the stronger half-bred mare, and trace the process of deterioration further ; but the final issue is the same—the propagation of a race of weeds. This is the real root of the evil which is affecting our breeds of horses,—an evil not to be remedied by the abolition of two or three-year-old races, or by the substitution of longer distances, or by any of the many suggestions with which, when political intelligence flags, our daily papers teem. Races for two-year-olds may be objectionable or otherwise, and eight-mile gallops may be excellent or cruel ; but, so long as racing is supported by the public as a pastime, the former will not be abolished nor the latter restored.*

Do away with the excitement of the struggle, and by greatly lengthening the race render its finish the slowest part of the contest, and people will be contented to read the result in the newspapers at home. Let us suppose that the racing of two-year-olds was altogether abolished, and that the Derby was contended for by four-year-olds, what would be the result? The expense of keeping race-horses would be enormously increased, perhaps to the extent of 100,000*l.* per annum.* And after all, even if these innovations could be introduced, they would altogether fail in their professed object—that of improving the stoutness of the thoroughbred horse.†

We frequently hear of horses that are very speedy for a mile, but fail altogether in a longer race. Now, on what does this want of stamina or stoutness depend? and, secondly, can it be discovered or ascertained by the external conformation of the animal? The speed of the horse depends on the length of the stride, and the

* The system of racing at two years old, whilst it is always trying and often fatal to the fore-legs and joints of the young animals, does not appear to be injurious to the constitution ; for we have numerous instances of famous stud-horses living to a good age, although they have raced thus early. That stout and successful sire the "British Yeoman," the winner of the first prize at the Royal Agricultural Society's Show at Chelmsford in 1856, fourteen years previously had won four large stakes as a two-year old, and the following year ran fourth for the Derby.

† If some of our stoutest thorough-breds have been discarded in consequence of their not being speedy enough to win short races, what has become of these horses, whose services would have been so valuable for half-bred mares? I rather believe that speed and stoutness are mostly combined in great winners, as in "Eclipse" and "King Herod" of old, and, at the present day, in "Stockwell" and "Blair Athol," the latter of whom unquestionably won his great races by his stoutness, for he was probably equalled in speed for half the race by several of his competitors. Surely the St. Leger, and other still longer races, must in nine years out of ten be won by stout horses, and as such horses are always used for the stud afterwards, they must have handed down to their posterity their stoutness as well as their speed.

frequency or rapidity with which these strides can be repeated, and in proportion to these efforts is the demand made on the organs of respiration and circulation and on the nervous system. Excessive speed is, therefore, in itself one cause of its short duration, inasmuch as it exhausts the vital powers. In many cases the locomotive and vital powers may not be well balanced: the former may be those of a first-class, and the latter those of a second-class animal. To a certain extent this want of bottom can be ascertained by the conformation, but to a certain extent only. If the horse is very leggy, light in the carcass, and narrow or deficient in depth of chest, the probability is that he is speedy, but not enduring. Sometimes, however, an animal shows none of these faults of form, and yet, though speedy for a mile, is unable to "stay." The cause is here, no doubt, beyond our ken; though it is, no doubt, due to deficiencies in the vital and nervous systems, and especially to the latter. To discover its existence, we presume, is the object of the advisers of four and eight mile races.

In the absence of proof, we much question whether the first-class race-horses of the present are inferior in endurance to those of former days. Why should they be so? They are descended from the best mares and the best horses, which have no doubt handed down with their speed that endurance and strength of constitution which contributes so much to make a winner. Want of endurance is not the defect of this race; put a feather-weight on the back of a weed, and in a light country he will probably beat the most valuable half-bred hunter, even in a long run; and yet with all this he is nearly valueless.

Next to the very first-class race-horses—the twenty prizes amongst a thousand blanks—there is no kind of horse of which this country has such reason to be proud as the half-bred, three-parts, and seven-eighths bred hunters, the highest combination in nature of strength and speed. Deriving speed and courage from their eastern progenitors, bone and substance from their northern ancestors, and action in all their paces from the blending of the two races, they are nearly perfect and decidedly most generally useful.

When a breed of sheep or of bullocks has reached this point, we seek to perpetuate their excellences by consorting parents who on both sides possess them, avoiding, of course, too great consanguinity. We do not resort, as a rule, again and again to the original breeds from whence the improvement has been built up.

Why, then, should horses be an exception to this rule? Why, although the mares of this stamp are considered well adapted for breeding, are the males condemned to be castrated, as unfit for that purpose? By such practice we not only lose the services of the males in transmitting their good qualities, but deprive one-half the mares of the opportunity of breeding animals as strong and valuable as themselves. The practice is, no doubt, in many respects a matter of convenience; for weight-carrying hunters are more tractable, and always, as geldings, command good prices; whilst it is hard to compete with the constant supply of ready-made stallions—good, bad, and indifferent—from racing stables, so long as their friends and owners can persuade breeders of horses and agricultural authorities that the goodness of the fore-legs is of little account, or that a bad thorough-bred stallion is better than a good half-bred.

Referring again to the general principles which have been laid down respecting the influence of either parent on the offspring and considering that the temper, nervous system, vital powers, and constitution, usually follow the dam, if the question be put, "Give a certain amount of breeding, which side would you prefer it to come from?" we unhesitatingly say, if it cannot be had from both sides, by all means let us have it from that of the dam, that her courage, nervous system, and vital powers may be, if possible, joined with the great bone and sinew of the coarser sire. If this system were more frequently pursued, we might breed weight-carrying horses from well-bred though rather light mares, and sometimes even from the best of the three and four year old mares cast out of the racing stable as not being good enough. By such means our cavalry would be far better mounted than at present, and we might, without difficulty, retain just as much breed as is requisite and desirable.* I do not, however, recommend such violent crosses as that of the cart-stallion with the thorough-bred

* An inspection of our cavalry regiments will strikingly illustrate the evils of the present system. I had an opportunity a twelvemonth since of looking over a rather large number of cast cavalry-horses offered for sale by auction in a garrison town, and found that nineteen out of twenty were extremely faulty. In most, although the carcasses were sufficient, the legs were totally unfit to carry the weight a cavalry horse is called upon to sustain. Crooked legs, weak sinews, deficient bone, small joints, sickle hooks, the evident result of the union of the two bodies of a thorough-bred horse and a coarse or cart mare, was almost the universal rule; and they presented a strong contrast to the animals that in my experience used to be cast some thirty years ago when half-bred stallions were far more numerous than at present, and horses were bred from parents possessing on both sides the qualifications sought to be perpetuated.

mare, though not unfrequently successful; or the reverse case, which, with a few noted exceptions, produces more failures.

As examples are always more telling than precepts, I propose to adduce a few instances of successful breeding with half-bred horses and well-bred mares.

To begin with my own experience. I rode a mare for some twelve years without her making a mistake; she was good in all her paces, a fair hunter, an excellent jumper, and a capital hack. She was bred by my father out of a three-parts-bred mare (a good hunter) by a young half-bred horse, pedigree unknown or forgotten. Her dam afterwards bred three other colts by thorough-bred sires, none of which proved of any value. They could not carry weight, and none of them paid the expense of breeding.

2. A rather heavy but active and useful cart-mare, belonging to the same owner, bred two colts by thorough-bred horses, neither of which repaid expenses: they had the bodies of the dam and the legs of their sires.

3. One of my friends had, some years since, a splendid trotting mare that he justly regarded as a pearl of great price, for she had substance, showed plenty of breed, and was good in all her other paces as well as the trot. After some years she was devoted to the stud, and bred five foals, the first by a good half-bred horse and the others by different thorough-bred horses. Her first foal showed much more substance than any of the others, made a good price, and is a valuable animal at the present day. Not one of the others repaid expenses; one proved a clever animal for a light weight, but none possessed sufficient substance to be anything like as valuable as the mare.

4. Another of my acquaintance some years since had a small but very neat mare almost thorough-bred. He put her to a large Yorkshire trotting stallion, and sold the produce at three years old for sixty pounds; when afterwards he put her to thorough bred stallions the stock were all deficient in substance, and consequently unprofitable.

5. A farming friend had a capital fast mare, somewhat small, and rather more than half-bred; he put her to the last named stallion, about one-fourth-bred: the produce, a mare now in my possession, is very clever and somewhat larger than her dam. Though too hot for the hounds, she is a capital hack as well as an invaluable harness-mare. I consider this to be a successful example of breeding from two parents, both well, but neither thorough-

bred. The dam of my mare was next put to a thorough-bred horse, and produced a foal which had not nearly the value of the first, gave out in the fore-legs, and was last seen in a London cab. The sire referred to invariably got good animals when put to well-bred mares, and useful ones when coarser mares were employed.*

6. Another of my acquaintance some years since gave 50*l.* for a mare apparently threeparts-bred, which now in her old age is such a model of symmetry that she attracted my special attention when recently exhibited at a local show. She proved to be a good hunter for an average weight, but before she could establish her character, became lame, was devoted to the stud, and has bred many colts. One of these, by a thorough-bred horse, became a very clever and valuable hunter for a moderate weight; the other colts were mostly by a light and rather leggy but very active Suffolk cart-horse, with good flat fore-legs and good feet. The oldest of these, which promised to be a capital jumper and a good weight-carrying hunter, was bought by a farmer (a heavy weight in the hunting-field) for 50*l.*, and after exhibiting his qualifications in a good run, was resold for 100*l.* on the same day. The new owner, hearing afterwards that he was got by a cart-horse, felt somewhat disgusted and parted with the horse for 80*l.* to a dealer, who very soon disposed of him for double this sum. The other two colts by the same horse are very promising. Although such a strong cross as this is not to be recommended, it is worthy of note as an example of the powers of the mare to transmit her qualities of speed and endurance to her offspring, so as to render them good hunters.

7. A late master of hounds in a neighboring county rode for some years a threeparts-bred stallion, that besides being a first-rate hunter was also used somewhat extensively as a stud-horse. His stock was almost universally good and remunerative to the breeders.

8. To these examples may be added some strong cases, kindly

*This horse was the son of "Performer," and the grandson of "Old Pretender," by "Fireaway" (celebrated trotting stallions of their day), out of a threeparts-bred mare, having the strains of "Forester" and "Hambletonian." "Old Pretender" trotted 15 miles within the hour, with 15 stone on his back, whilst "Fireaway" did 2 miles in 5 minutes. It is matter of very great regret that this breed of horses has not been kept up in all its integrity, and that trotting-matches have been allowed to sink into disreputable and low hands. Probably the cruelty that was often connected with these time-matches, in which the same horse was backed to go, say, from London to York, or to Exeter, in some short time, led to their being discountenanced by the more respectable lovers of the horse.

communicated to me by Mr. H. Overman, of Weasenham, Norfolk :—

“H. K. S——, Esq., of W——, Norfolk, had two horses of extraordinary good qualities as weight-carrying hunters; they had great pace and endurance, and were good performers. He rode them in Norfolk, Northamptonshire and Leicestershire, and refused 700 guineas for the two. Their dam was a thorough-bred mare that ran well in the Oaks, and their sire was a half-bred cart-horse and hackney, with fine shoulders, good action, strong loin, deep girth, and good thighs and legs.”

9. Mr. Overman adds: “I used the same horse to two mares of my own, one a well bred Irish mare. She throw a filly, which I sold for 100 guineas, and has since made nearly 200. The other mare was threequarter-bred, and she threw a colt which turned out one of the best performers I ever saw. I sold him to H. B——, Esq., of Norwich, for his brother in Surrey for 130 guineas, and 400 guineas have since been refused for him.

10. “One of the best horses now in Lord H——’s hunting-stables was by a Norfolk hackney out of a half-bred hunting dam. We find in Norfolk if we put our Norfolk hackney to a well-bred mare with size, she is sure to throw a good animal. ‘Tom Moody,’ the property of Mr. J——, of Hopton, was not thorough-bred, neither was Mr. Goold’s ‘Shackaback;’ and these two horses are the sires of scores of good and valuable horses in this county.”

He adds: “The late Mr. Theobald, of Stockwell, in Surry, always said that it was much better to put the hackney horse to the blood mare than to adopt the reverse plan; the former course being almost sure to bring a good animal. A blood mare, the property of an uncle of mine, bred seven foals by hackney and cross-bred horses, and all proved animals worth a good deal of money.”

My purpose in adducing these examples is to show that useful horses almost always, and valuable ones very frequently, can be bred as hack, hunters, and carriages horses, by using the half or threeparts-bred stallion with well-bred mares, so as to secure a sufficient amount of substance to carry weight. Not that we can thus breed horses of greater value than by using the thorough-bred stallion with suitable mares, for we can scarcely have too much breed, provided we have sufficient substance; but by following the system recommended, if we do not succeed in getting higher prices, we shall at any rate have fewer failures.

We have seen that with regard to sheep at least three different and valuable breeds have been inaugurated by cross-breeding, careful selection, and constant weeding; and the prevailing opinion is, that these possess certain desirable qualifications which render them more profitable than their parent races. Still there are those who deny this, and contend that there are pure breeds of sheep that can supply every requisite. Be that as it may, the case is much stronger with regard to the horse; for there is no one who would contend that the qualifications of a first-class weight-carrying hunter can be met with in any one pure or original breed, or that it can be otherwise secured than by the well-assorted alliance of blood and bone. Surely, then, if with sheep we can succeed in the course of twenty years in establishing a distinct breed, we can with equal or greater ease establish a breed of horses that will support with ease a six-foot guardsman with his heavy accoutrements, and dash into the charge with all the speed and spirit induced by the influence of a full equivalent of blood derived from both parents. The French are already trying this system; and if we are remiss, will in a few years surpass our cavalry in its most essential characteristic. There can be no reason why the defects which crop out after the first cross should not be as readily extinguished in the horse as in the sheep.

It is as well to notice, that valuable as is the Norfolk trotting stallion, when put to well-bred mares for breeding hacks, he is as a rule too deficient in size to get dragoon-horses, or those weight-carrying hunters which have been the glory of our land.

One argument adduced by the advocates of the universal employment of the full-blood sire is somewhat plausible, and has not perhaps been sufficiently disposed of. They say, it is desirable to have a pure-blood on one side at least, so that defects appertaining to the progenitors, but not apparent in the parents, may not, as in mixed pedigree, reappear in the offspring. This argument is good to a certain extent, but it applies equally to each parent, and if it can be dispensed with in the case of the mare in order to secure size and bone, it may also be given up for equal advantages in that of the sire, who would not have been devoted to the stud unless in addition to his pure lineage on one side, he had derived from the other some rare hunting qualifications and sterling merits which it would be most desirable to perpetuate.

CONCLUSIONS.

We have endeavored in our preceding remarks to establish the correctness of the following points :

(a) That the use of the thorough-bred horse or mare has greatly improved the coarser bred in speed and bottom. That the blood has amalgamated exceedingly well with other breeds, and that the good results of even one cross only has been seen in various degrees and for several generations.

(b) That the effect of crossing with the thorough-bred is to increase the supremacy of the nervous and the muscular systems, and is more particularly shown in the fuller development of the thighs, the hind-quarters, and the elongation of the muscles generally. But that with these advantages the bones, joints, ligaments, and sinews are smaller and less powerful, and the action, although quickened, is rendered lower and less safe. The ability for jumping and for carrying heavy weights without injury to the joints and sinews, is greatly diminished. The skin is also rendered thinner and more liable to abrasion, the carcass smaller, and there is a diminished capability for putting on flesh.

(c) That so long as suitable mares with sufficient substance can be procured, the breeder of hunters should, on the rare occasions when they are offered, avail himself of the services of a first-class thorough-bred stallion, or even one of the second class, provided he has hunting qualifications,—good substance, or good high action in the trot or walk.

(d) If, going a step further in the same direction, the breeder seeks to put the female progeny to the blood-horse, he will most frequently fail ; the offspring becoming too light ; whilst if he had availed himself of the half-bred or three-parts-bred stallion (the grandson of a great racehorse,) his stock having the same amount of breeding as the dam, would have afforded him a fair chance of realizing a high price, and failing this, a comparative certainty of a fair sale for the cavalry, or for the general market.

(e) Having duly recognized the claims of thorough-bred horses of the first and second class, we can only advise, with regard to the third and inferior classes, that their services be altogether dispensed with, their place being taken by three-fourths, or half-bred stallions, possessing bone, substance, and good hunting qualifications. And it is such animals as these that deserve encouragement from our great Agricultural Societies.

For the encouragement of horses of this stamp we should be

glad to see prizes offered for the best seven-eighths, three-fourths, and half-bred stallions, so that the owners of promising horses might be induced to delay the operation of castration until the animals had undergone the ordeal of the show-yard, and the prize-winners might be launched into the world with the Society's approval. Some of the prizes for ponies might well be dispensed with to provide money, if it be wanting, for this more important purpose. At any rate, it may be hoped that the Council of the Royal Agricultural Society will remove the impediments which shut out such a horse as "British Statesman," the first-prize winner at Battersea, and the second at Leeds, from competing at Newcastle among the stallions for breeding-hunters. The flaw in his pedigree, one-eighth, gave him, no doubt, more bone, sinew, and substance generally, and rendered him fit to carry an extra stone in weight, qualifications which doubtless gained him the prize of 20*l.*, offered by the gentlemen hunting the North Staffordshire hounds, for the best stallion for hunting horses.

This suggestion is not meant to imply that prizes for thorough-bred stallions should be dispensed with: on the contrary, if the state of the Society's funds permit, separate prizes should be offered for thorough-bred sires, adapted—

1. For getting Hunters ;
2. For Carriage Horses ;
3. For Park Horses, Chargers, or Hacks.

Prizes in each of these classes would then be assigned to animals differing much in character, but no longer, as at present, to the best race horse, or according to the rather puzzling and peculiar condition of the prize-sheet, "to the horse best calculated to perpetuate the breed of the sound and stout thorough-bred-horse for general stud-purposes." Such a horse must unquestionably be neither more nor less than the sire of the greatest race-horses of the day.

But if this is too wide range for an Agricultural Society, the Managers of the Islington horse show may take this hint into consideration.

Those of our readers who were present at the splendid exhibition of thorough-bred stallions in the Agricultural Hall last summer, must have been struck with the great variety that obtains in the shape and action of the thorough-breds then exhibited, and might, without any assistance from the judges, point out the particular horses with suitable characteristics for each of the several purposes

- above mentioned. "Caractacus" and "Nutborne" may be taken as correct examples of the true *race-horse*. The sprightly "Neville," with his splendid knee-action, may be regarded as the proper sire of the charger and the park-hack, whilst the powerful "Warlike," with his compact frame, is the very type of a weight-carrying hunter, so far as a blood-horse can be one. "Newcastle," the favorite of the judges, might put in a claim either as a hunting-sire for a moderate weight, or, with his fine action and good legs, as the sire of a charger or park-hack; and he probably gained his honors because he was thought to combine best in his own person the several and diverse qualifications required by the conditions of the prize-sheet. There were also some showy animals, with long arching necks and grand action, that might properly be considered as suitable sires for high-bred carriage-horses.

THE HORSE.

HIS NATURE AND TREATMENT.

(Found among the papers of the late M. A. Cuming, V. S.)

[The following paper appears to have been prepared for delivery in New Brunswick as a Lecture. It bears evidence of that intimate acquaintance with his profession, and the strong practical common sense so apparent in his other written productions. The slight variations which he might have made to adapt it to the latitude of Maine, will readily suggest themselves to the reader, while the valuable practical hints with which it abounds may be as useful here as in the adjoining Province. Those who remember the valuable contributions of Dr. Cuming to our reports for 1857 and 1859, will need no prompting to give this a hearty greeting.]

In directing attention specially to any subject or object, it is always well, I think, to have clearly in our mind's eye the precise place in the world of *thought* or *being* which that subject or object occupies; as by so doing, we can not only confine our attention the more strictly to the matter itself under consideration, but we can also the more easily apprehend the connections and relations which exist between it and others of like kind with which it may chance to be associated or have to be compared.

The subject of the remarks I bring before you is "The Horse, his Nature and Treatment," with special reference to things as they exist in this country. The subject is a wide one,—would be more easy to make into six or a dozen lectures, than into one, and consequently you can only expect an outline of what might be said upon it; an indication as it were, of the ideas it suggests, rather than a full discussion of the points it involves.

In order to make the most of the limited time at my disposal when I began to put together these remarks, I proposed to myself the following arrangement:

- 1st. The natural history of the horse and his natural condition.
- 2d. The rationale of domestication and the changes it produces.
- 3d. The treatment of the animal, or what we should do for him.
- 4th. The working of him, or what we expect him to do for us.

I have made a diagram showing the place in the animal kingdom

which the horse occupies; and should this introduction of a thread of general natural history tend in any degree to promote the study of this interesting department of science, I trust you will excuse me for bringing it in.

Naturalists for the purpose of classification and identification, have divided the whole animated world,—all that live, move and feel,—into four well-marked divisions or sub-kingdoms, beginning with the lowest in the scale of organization, viz :

1st. The Radiata, of which the star-fish and a great many similarly constituted animals are examples.

2d. The Mollusca, of which the shrimp and common snail are familiar examples.

3d. The Articulata, embracing insects, crustaceous shell-fish and many others.

4th. The Vertebrata, or all those animals having an internal bony skeleton, its parts connected together by a back bone, spine, or vertebral column.

The Vertebrated sub-kingdom naturally divides itself also into four well-defined classes, still ascending in the scale of organization and intelligence, viz : the fishes; the Reptilia or serpent tribes; the Aves or birds; and lastly the Mammalia, or those animals that bring forth their young alive and nourish them with milk secreted by Mammæ or teats. To this last named class belongs the horse.

The Mammalia are again divided into two well-marked sub-classes, each consisting of several orders. These sub-classes are, the *Ungiculated* or clawed, those animals having the extremities divided into toes or claws, as in the cat, dog, mouse, lion and many others, and the *Ungulated* or hoofed animals, among which again is the horse.

Of hoofed animals there are two recognized orders, viz : the *Ruminantia*, or those that in the language of the Old Testament “part the hoof and chew the cud,” and of which the cow, sheep and deer are well-known examples; and the *Pachydermata*, or those hoofed animals that do not ruminate. The Pachydermatose order as you will see marked on the diagram, consists of three groups: the *Proboscida*, to which belongs the elephant and some other animals now extinct; the *Suidæ* or pig tribe, of which also there are some extinct species; and the *Solidungula* or solipeds, those animals having the hoof or foot in one solid piece or toe. According to our present knowledge, the solipeds consist of but one genus or

PLACE OF THE HORSE IN THE ANIMAL KINGDOM.

<i>Sub-Kingdoms.</i>	<i>Classes.</i>	<i>Sub-Classes.</i>	<i>Orders.</i>	<i>Groups.</i>	<i>Genus.</i>	<i>Species.</i>
Radiata, Mollusca, Articulata, Vertebrata,	{ Fishes, Reptiles, Birds, Mammals,	{ Unguiculata, (i. e. clawed) Ungulata, (i. e. hoofed)	{ Ruminantia, Pachydermata,	{ Proboscidea, Suidæ, Solidungula,	{ Equidæ,	{ Caballus.
					Equus Caballus, THE HORSE.	

family, the *Equidæ*, to which belongs the horse, ass, zebra and some others, and of this family the horse forms the species *Caballus*. Thus you see among animals the horse belongs to the *Vertebrated*, or *boned division*; to the *Mammiferous*, or milk-giving class; to one of the two *Ungulated* or *hoofed orders*; to the *solid-footed group*; and in the language of the naturalist is known as *Equus caballus*. You will see also from this classification that setting aside his individual qualities, the horse is nearly related in organization to almost all those animals that are most useful to man as giving him their services in the shape of labor, of food, or of clothing. Thus man has as his servants the camel and dromedary, hoofed animals, specially fitted by nature for the African deserts, and the elephant equally so for the jungles of the East. Then the horse, the ass and mule for service in more temperate regions, while even the Laplander in his land of snow, has his faithful and useful servant the reindeer. And then for clothing and for food, we have the sheep, the ox, the pig and the goat, all animals of the *Ungulated* or *hoofed* kind, and if we were to compare more minutely the *structural peculiarities* of these animals, we would find about them evidences of design and creative contrivance admirably adapting them for the ends they were intended by nature to serve. It is to one of them only, however, that we must confine our attention.

The natural condition of the horse is that of entire freedom; freedom to choose his food, his drink, his lodgings, and his associates. The anatomy and physiology of the covering of his body show him to be a native of a warm or at least a temperate climate. The furnishings of his mane and tail are defences given him by nature against the numerous insects with which such climates abound. The structure of his teeth, and digestive system, show his food to be both herbs and seeds. The smallness of his stomach, and the rapidity with which food passes through it, indicates him a continuous eater, and left to himself he feeds twenty hours out of the twenty-four. His organs of circulation and respiration mark him as capable of severe and sustained exertion; but at the same time as requiring a constant supply of pure, free air. The development of his organs of smell shows this faculty to be peculiarly acute, and the formation of his eye tells us that he is a nocturnal feeder and traveler, and can distinguish objects placed before and below him nearly as well by night as by day. The nervous sensibility of the bristles about his muzzle and eyebrows tell his acuteness at detect-

ing "a snake in the grass," if such should be; and his acute and ever open ear, capable of direction to every point of the compass, mark his aptitude at observing danger. The hardness of his hoofs and the power of his jaws show the means of offence and defence which he possesses; while the suppleness and fleetness of his limbs afford him in emergency the speedy means of retreat. He is highly social, and gregarious in his habits, fond of company, a protector of his friends and a terror to his enemies.

Such are a few of the means by which nature has adapted the horse for taking care of himself and for making his condition comfortable; we will find a benefit in keeping them in view when we come to consider the domestic condition of the animal.

There is nothing which theoretical writers and imaginative artists have troubled themselves so much about in regard to the horse as to make out the picture of a perfect animal, and there is nothing on which, one with another, they have so much differed. Some would have one, some another part of his body to be large and well-developed for the sake of strength; others would have the same to be small and fine for the sake of beauty. One would have certain of his bones to be long to give him speed; another would have the same to be short to make his motions easy. One would have him to excel in this respect, and another in that, and coming to particulars there is no end to the variety of forms and proportions that have been put forward, all as parts of the *perfect horse*. The reason of all this diversity is, that the thing sought for does not exist. In domestication there is no such thing as a perfect horse, any more than there is a perfect man. Take him as he roams wild in the desert and we find him in every respect *perfect, suited and designed* for the kind of life he leads; but bring him into the service of man and immediately the case is changed. The animal is the same in all his parts, but the purpose is changed to which these parts are applied, and that which before was perfection may now be either a superfluity or a defect.

The *rationale* of domestication is this: we take the animal from the state in which nature has planted him, and we inflict upon him certain artificial conditions at variance with his natural habits; in doing this we subject him to undoubted injury. But then in compensation we provide him advantages which in nature he could not obtain, and the good or ill of domestication, so far as the animal himself is concerned, lies in the balance between the injury thus inflicted and the equivalent compensation. For instance, we deprive him of

his freedom to roam where he lists, but we can if we will compensate for this by providing him a safe and comfortable lodging and shelter. We deprive him of the power to select his food, and take it when and how he will, but we can compensate by providing it of better quality and with less labor in the gathering than he could otherwise have. And so on with other things that I need not name. And then again with his work we put him to tasks which in the state of nature he never has to perform ; we can only compensate for this by cultivating and developing from generation to generation those parts of his mechanical structure which being in excess of strength renders it the easier for him to perform the labors we assign. Thus if we wish him to draw we cultivate the points upon which the power of drawing well depends, till we produce a *breed* suitable for hauling only. Then if we wish him for the saddle we select and cultivate other points essential to speedy progression and the bearing of weight, and we produce the *road horse* or the *hunter*, and if we want him to race with we must develop parts different from either, for it must be borne in mind that it is not a matter of accident, nor from fancy, that we select one form of horse for one kind of work and another for another ; but that there are certain definite mechanical arrangements in the structure of the animal, the deviations from which in one way may increase his usefulness in one respect while in another way it may do the reverse. And that in regard to certain of his powers and these not the least important, the horse is as much a machine and as much depends upon the mechanical adjustment of his parts as does the watch or the steam engine ; and that if we put him to purposes for which he is by conformation unfitted, we are as sure to be disappointed in the result as if we set a locomotive to do the work of a time-piece, or expected the town's clock to drive a sawmill. When, therefore, a horse gets into any unusual condition, or when anything out of the common course requires to be done for him, we are apt to ask "is the thing natural?" And in so judging we think we have a guide as to whether it be advisable, and so far well. But in reasoning thus it is necessary always to keep in view that the nature of the animal is modified and changed by his domestication, in neglect of which we are prone to go into error rather than out of it. For instance, it is not natural for the horse to eat cooked food, to wear shoes nailed to his feet, nor to pass his time inside a close house. But in domesticating him we find these variations from nature necessary, and to compensate we must see that his food be

properly cooked ; that it be neither hot nor stale. That his shoes be *suitably filled* to his feet, his size, and his work, and that the cleanliness and ventilation of his lodgings be attended to. And so on with every possible variation that may occur, always keeping in mind that the *rationale* of profitable domestication is not adherence to nature, but compensation for our deviations from it.

On the treatment of the horse, I would notice the following points, viz : his feeding, his lodging, his shoeing, and his harnessing.

The natural food of the horse I have already mentioned is herbs, grasses and seeds. In his free state I am not aware that he ever feeds on roots. It may be that the roots of wild plants are distasteful to him. It is more likely that few of them ever come within his reach. Be this as it may, it is one of the modifications of his constitution which domestication has produced, that certain roots are not only agreeable to his palate so as to be highly relished, but they are also exceedingly nutritive to his system. We take him from those temperate regions of the earth where vegetation every day furnishes him with something fresh and succulent, and we tie him up eight months of the year on dry and often ill-preserved provision. It is the least we can do in compensation to give him every day a portion of food as near as may be in composition and condition, to those vegetable juices for the digestion of which his stomach was made. Whenever therefore we put a horse on dry hay and grain we should always give him, once a day at least, a portion of root-feed ; and without entering into the chemical composition of the different root crops of this country, which present time does not permit, and without disparagement to others, I think the preference is to be given to the carrot and Swedish turnip, and in ordinary cases they may be fed raw, with full as much benefit as cooked ; a statement which does not apply to the potato when similarly used. Horses fed for a special purpose, as preparing for a race, for instance, may be kept for some time almost on grain alone, but as a general rule no horse can long sustain health without a considerable proportion of fibrous food, hay or stalks of some kind. In this country hay seems the favorite, but taking it in its general quality as we see it brought to the St. John market, I question much if it deserves the preference, even for its feeding qualities, while as an article of agricultural produce it is decidedly inferior to others that might be raised.

Of grains, oats have been preferred wherever the Saxon tongue

is spoken, ever since Dr. Johnson characterized them as "food for *Scotchmen* and *English horses*"—how long before it is hard to say, nor I think is the preference unmerited; no other grain of ordinary growth, given alone, will sustain the horse so long in health and enable him to do the same amount of work as oats will. Barley or linseed will fat him faster, and peas or beans will enable him for a time, to sustain a greater amount of muscular exertion, but either of these grains if alone used, will soon tell to disadvantage on the digestion and constitution of the animal; mixed in limited proportion with oats they may be used with great advantage. Speaking of oats, allow me to notice an idea commonly prevalent, that any quality of the grain is equally good to feed a horse with, if he just get a little more weight; but such is far from being the case. If you take a light oat, and a heavy, and steep or boil them, the heavy, well filled one swells, softens and bursts in the process; the light, lanky grain remains as it was. The same occurs in the stomach; the good grain is digested, the inferior is rejected and fails to give up even the small amount of nutriment it has. When a provincial exhibition has to be got up, New Brunswick produces her oats forty-eight and fifty pounds a bushel, but when her horses are only to be fed, thirty to thirty-five is more the mark. Now to say the least of it this is sad waste of capability. When the soil and climate of the Province can produce the superlative samples of oats that were shown at Frederickton in October last, why should it ever do less? Or why should your horses have but harsh and shriveled husks to feed upon, when a better system would afford them plump and nutritious grain? Perhaps by these remarks I may be doing injustice to this part of the country. But I can assure you that in St. John, in the best stables public and private, I see oats in daily use that the poorest hill farmer in Scotland would think a shame to see on his barn floor, and which if a Scotch ploughman were told to take and feed his horses with, he would turn up his nose, and tell his master that he could not expect above half work to be done. While speaking of grain, there are two other kinds grown in the Province that I may be expected to notice, namely, the Indian corn and the buckwheat. Of the first, I hear various reports, some recommending it, and some the reverse. Its chemical composition would indicate that it was, like barley and linseed, better adapted for fattening than for working on, but in my own experience I have not seen enough of its use to be able to pronounce an opinion. Of the buckwheat I can speak even less; all I know being that it belongs to a family of plants (the *Polygonum*)

which in their wild state, and the horse left to himself, he avoids to touch, a fact which does not speak in its favor.

One remark more must dismiss for the present the qualities of the horse's food. Recent chemical and physiological researches have shown in all feeding substances, two notably different elements serving widely different purposes in the economy of the animal fed. The purposes served are the supply of muscular waste, as produced by labor, and the keeping up of the animal heat. To promote the first, those substances are most useful that contain the largest amount of glutinous or albuminous matter, such as peas and beans; for the second, sugary, starchy and oily food, such as barley, linseed and corn, are best adapted. And the reason why oats are so *generally* useful, may be, that they hold a place intermediate in chemical composition between the one and the other, but the practical hint to be derived from science as regards this country, is that the grain food of the horse *should differ with the season of the year*. In the heat of summer, when fat is a burden, the muscle forming elements in the food should prevail; while in winter, with an atmosphere eighty or a hundred degrees below the temperature of the blood, and every hair standing at its own particular angle, we require to feed, not only to fit the horse for his work, but also to keep him warm; then the oily, saccharine and starchy grains should be more largely allowed.

In addition to the food of the horse being suitable in quality, something at times depends on the condition it is given in, and *much upon the timing of it*. His masticating apparatus is a peculiarly efficient one, and when he has little to do, and his food is of good quality, no preparation of it is needed. But if he be overwrought, if his grain be light and of inferior quality, or if old age has begun to impair his grinding organs, then the case is different, and anything that we can do to lessen the expenditure of muscular and nervous energy in the digestion of his food, is a positive advantage, a compensation in some measure for the labor that we exact. With barley, beans and peas, boiling is the best preparation. With oats or linseed it is different. Boiling does not render either of these digestible unless the seed be plump enough to burst the husk, but it often leads the animal to swallow with a less amount of mastication, and as a consequence, if the grain be light evil is done instead of good. With oats, such as I see in common use in this country, I would say do not boil, but if you wish your horses to thrive, bruise, grind or crush them.

As to the feeding of the horse with regard to time, I have already noticed the smallness of his stomach and the continuance with which he eats. Two or three things are to be learned from this. One is that he is particularly ill-adapted for long fasting. Another that he should have his feed put before him at intervals of time, and in moderate quantities. And a third that he should never be suffered to gorge himself with food on an empty stomach, after a long fast. These points I can only stop to indicate; to go into the rationale of them, and of the evils arising from a neglect of them, would require a chapter to themselves. But I must pass on to the next point of our treatment, the lodging of the horse.

The structure of his skin and hair I have already noticed, show him to be the native of a warm or at least a temperate climate, and bespeak for him a dry, moderately warm, and equably temperatured habitation. The large expansion, delicate structure, and important functions of his lungs, tell the necessity of pure free air and adequate ventilation. His love of freedom, social disposition, and more than either, the structure of his feet and pasterns plead for the loose box in preference to the stall; and his eye, better suited to a subdued than a glaring light, indicates the color of the walls of his dwelling and the manner in which it should be lighted.

If we bring the ordinary plan of stable structure in this country to the test of these rules, we will find a good many things to modify and amend. At first, after arriving in the Province, I was a good deal troubled at people always calling the stable *the barn*. On better acquaintance, however, I began to find that "*barn*" was, after all, the more appropriate name, as the erections in question had few or any of the requisites of stables about them. To prevent the products of respiration, transpiration, and the fumes from the floor from escaping in the natural way, that is, upward, there is usually close over head a well packed mow of hay, straw or litter; and lest he should become too warm about the legs and body, a free current of cold air is circulated below the floor and through a hundred crevices in the lower part of the walls; making ventilation where it should not be, and preventing it where it should. And then the stalls, short, dark, and sloping backwards; no wonder that we find the horse often hanging back in his halter and seeking to get into a better position and light. The trouble is, how is this ruinous system of housing to be remedied? for ruinous it is both to the health and usefulness of the animal; not easily, so long as the present style of structures are retained, but

with little trouble when new ones have to be built. All I can reach at present, however, is to indicate general principles, leaving details to be otherwise filled up; and first as to the temperature. The climate is by all allowed to be prone to extremes, heat in summer and cold in winter, and one use of our stables is to equalize this. If we wish to preserve vegetables from fading, or water from becoming hot and vapid in summer, we put them into an underground cellar; if we wish to preserve the same things from freezing in winter, we do the same. And we do so, and are justified in our doing it, on the principle that the range and variation of the temperature of the earth is very much less than that of the air. Now I am not going to advise you to put your horses into cellars, far from it, but I am going to say that instead of raising the floor of the stable *one, two, three*, and sometimes *six* feet above the ground, as we commonly see them, if they were as far sunk into it, *care being had by sufficient drainage to make the bottom dry*, it would be very much to the advantage of the animal for health, comfort, and usefulness. The farther the floor was sunk, dryness being provided for, the warmer and more uniform would the temperature be, and the less would the limbs and body of the animal be exposed to those draughts and cross-currents which are the cause of half his ails. But some will say, if you close the house up at the bottom this way how are you to get it ventilated? Simply, I reply, by having it more open above. There is a very erroneous notion about ventilation,—prevalent even with many who should know better—that it cannot be properly effected without through draughts. But such is not the case. The laws which nature has established for the dispersion and diffusion of gases, if left free play, require no such adventitious aid. Nature has given to every kind of gas and vapor a tendency to distribute and equalize itself through every other with which it may be in contact. This can be best shown by the following simple experiment. You are aware that some gases are light and others heavy, some colored and others transparent. Take two pieces of thin glass tube such as this, but close at one end, fill the one with hydrogen, a colorless gas and the lightest of all known substances; fill the other with chlorine, a green colored gas distinguishable to the eye and thirty-five times as heavy as the other. Then connect the two tubes together so as to exclude all external air, but leave free communication between themselves; turn the tube with the light gas uppermost and mark the result. Were it two liquids so placed the heavy one

would remain at the bottom and the light one above, for any length of time; not so with two gases; in a very short time one-half the heavy gas has ascended into the upper tube, displacing a portion of the light one, which has descended to the lower; in fact the two have become equally mixed and diffused. Now this law of diffusion holds equally good in the extended sphere of the stable, as in the limited one of the glass tube; and to have the benefit of pure air there without its disadvantages our through draughts should be made above the horse's head, instead of below his heels. Give plenty of height and establish a supply of pure air above the animal, and let the matters below look to themselves, nor fear for their escape. This would do away with the convenience of the spare room above the horse for the stowage of his winter provender, and the sooner the better, for although the hay-mow forbids the free diffusion of the foul vapors continually rising to it from below it is peculiarly apt at their absorption, and the poor animal has the fetid emanations from his lungs, his skin, and even worse, dried and daily laid before him in his food, forming, I see great reason to believe, one of the causes why broken wind is so notoriously prevalent in this country beyond what it is in places where a better system of stabling exists.

I have only time, in regard to the shoeing of the horse, as a part of our treatment of him to notice one or two of the leading principles as they bear upon errors in the plan of shoeing that I see common in the country. One of the most obvious errors to be noticed is the cultivation of *long toes*. Here is an example of a fore foot picked up the other day, not by any means the worst that could be found, but carried sufficiently far to illustrate the plan pursued, and show the form of foot that the blacksmith makes. Here are the bones of the foot as nature makes them; compare the two. The one has its greatest dimension longitudinally, the other transverse; the one projects forward and downward, the other is turned up and notched back; now which of these forms is likely to be best, nature's or the blacksmith's? When the foot is unshod and the horse at liberty, the growth of the hoof is barely sufficient to provide for the constant wear and tear of the sole and toe, and consequently no part is superabundant. But the shoe prevents this tear and wear without materially checking the growth of the hoof, and in compensation, every time the shoe is off, the foot should be brought as near as possible to the shape that nature gives. The sole should be thinned, the lower edge of the crust

cut down, the toe shortened, and rather turned up than pointed downwards; and the frog and bars, parts that are exposed to the wear of the road, left entire. The reverse of this, however, is commonly done; the *frog*, *bars* and *heels*, the whole back part of the foot is cut away, and the toe is left long. Look for a moment at the effects of this upon the horse. The function of the fore leg is mainly that of supporting the weight of the body, neck and head, and of transferring that weight forward from point to point, the time the animal is in motion. In performance of this, its mechanical action is near akin to that of a spoke in a carriage wheel, it is in fact a lever, but one of the third class, in which to give increased speed the power acts at a disadvantage, the fulcrum or fixed point being at the long end of the lever; this long part is the leg from the elbow to the ground, the toe being the fixed point over which the body is raised, and any addition made to the length of the toe is just the same as placing a block before the wheel of a carriage; it acts against the muscular power of the horse as used in the carrying forward of his body. Nor is this the only evil, every addition made to the length of the toe, (especially if the horse be made to stand as he commonly is most of his time in a stall with the floor sloping backwards,) every such addition throws an additional strain upon the tendons and ligaments that support the back part of the leg; and the horse to relieve himself stands either with the foot pointed or the knee flexed, both positions known to horse fanciers as signs of something going wrong. It would be well when such symptoms show themselves, and save the usefulness of many a good horse, if the true cause were understood and the evil remedied.

Another of the evils arising from the long toe is all I can at present notice. It very often leads to brushing and interfering. The horse finding the long projection in front as so much leverage acting to his disadvantage, gradually gets into a habit of raising himself from one or the other of the quarters. If he rise from the inside he throws the thick part of his pastern into the way of being struck by the upper part of the hoof of the other foot. If he rise from the outside, he throws round the edge of the shoe and runs the risk of cutting with it the opposite leg. So much for the long toe; if it were made of as pliable material as we find our boots to be in this wet weather, the first few steps would knock it out of the way, but to prevent this we hoop it with iron and make the infliction sure.

Another evil in shoeing that I have had to complain of almost daily since I came to St. John, is the want of a clip or projection turned up in front, to form an abutment against the point of the toe. I have already noticed the way in which the fore leg transfers the weight of the body forward from point to point. In doing this a considerable degree of concussion is inflicted upon the foot every time it strikes the ground. The direction of this concussion is neither forward nor downward, but between the two. It partakes of the horizontal motion of the body of the animal along the road, and of the perpendicular direction of the descent of his weight. The hoof of the horse is composed of an infinite number of dense fibres strongly agglutinated together; and to meet and support the concussion these fibres are every one of them so placed as to receive the shock directly on their ends. In addition to this, the front part of the hoof, where the force of the concussion is greatest, is twice or thrice as thick and strong as the sides and heels. Now the design of all this extra strengthening is very obvious; and by turning up a clip on the shoe as an abutment for the toe to press against when the foot comes to the ground we make both shoe and foot to act together in harmony. We save the shoe from being knocked off and at the same time we promote the natural action of the foot. In shoeing without this simple improvement the nails have not only to support the weight of the shoe, but they have also to bear the force of the foot striking the ground; and the shoe being found from these two causes more inclined to come off than is wished, recourse is had to nailing, not only at the toe, where from the thickness of the hoof it is harmless, but round the quarters and even to the heels. Here is a shoe made in the capital of the Province, that well exemplifies the system. I do not know if it be one of those that took the premium at the exhibition, but I know it is one of a set, all of the same form, that came down to St. John a few weeks ago, the unfortunate wearer being lame on all four feet at once, and showing more forcibly than I can describe, the evils of fettering with iron bands the foot in its most elastic and expansive parts. Time does not allow me to enter into the subject of shoeing farther, but there are two or three rules which it may be worth keeping in mind. At every shoeing have the toe shortened and the crust and sole taken down to the condition of the unshod colt. Give an even bearing to the shoe upon the hoof all round, and the toe a solid abutment against the shoe, and never allow a nail further back than the widest part of the hoof. Attention to these

rules, though it cannot remove, will in some measure compensate for the wholesale evils of nailing one of nature's finest structures to an insensible iron ring.*

On the harnessing of the horse I will only trouble you with one remark ; it is in correction of an error that is frequently fallen into of placing the draught too low down upon the shoulders. I have already mentioned the use of the fore limbs to be the support of the weight of the body and the transference of it forward ; that of the hind ones is the propulsion of the whole onward, and often in addition a heavy load to boot. We only need to glance at the skeleton to see the way in which this propulsion is effected. Tracing the outline of the bones from the hind feet to the onset of the neck they are a section of an arch, the upper and forward part of which in drawing, presses against the weight to be moved, that is if the point of draught be sufficiently high, but bring it down to the bottom of the shoulder, and you change the arch into a form much less capable of resisting pressure. This, however, is not the evil most to be complained of. The shoulder blade is the bone against some part of which the pressure of the collar must be made ; and it is of importance that this pressure should be upon that part of the bone that has least separate motion of its own, in order to avoid the gnawing and wringing of soft parts, between the hard bone within, and the often equally hard collar without. The attachment of the shoulder blade and fore leg all together, to the body is by muscle or flesh only ; there is no bony connection between them as in man and many other animals, and the attachment of the great bulk of these muscles is inside the bone about its mid-length. This, therefore is the part of the bone that has least independent motion of its own, and as if to mark it out unmistakably as the point of draught, nature has placed on it a strong and prominent bony ridge, against which the collar should abut. If it always did so, cases of shoulder bruise and shoulder lameness would be much rarer than they are. There is one remark, however, in connection with this to be made. The collar will never wear fair unless the line of the draught be about at right angles to the shoulder blade. In horses with very slanting shoulders, unless

* Those desirous to learn the writer's views on this subject more fully, are referred to the report for 1837, which contains a paper of nearly thirty pages from the same pen, and which is illustrated by engravings. There is reason to believe that it has already served to yield untold relief to the horses of Maine, and this connected with great pecuniary advantages to their owners. S. L. G.

the line of traction be proportionally depressed, if the point of draught be held high up, the collar is apt to jerk upwards and confine the breathing of the windpipe beneath. This, however, does not show that the principle of fitting the draught is wrong, but that we are using a wrong kind of horse for that purpose, and this brings me to the concluding portion of my observations, namely, the "working of the horse."

One of the chief purposes for which this useful servant of man is wanted is to draw. It may be to draw heavy loads upon the road, or to plough the land to a useful depth, or perhaps to haul timber in the woods—it is all the same, if it be draught that is wanted—there are certain forms and proportions of parts more suited to this than others. In the first place he must have weight, that as the body to be moved is heavy we may oppose weight to weight. But then the weight must be of the right kind. As the bones are the levers, by means of which all the motions of the body are effected, the bones should be short, strong, and heavy. And the muscles and tendons being the cords by which these levers are moved, should be strong and heavy also. As a rule therefore, the horse that is to be used for draught if suitably proportioned cannot have too much bone and muscle.

I can fancy an objection to this that a horse may lose in activity more than he gains in strength, but such is not the case. It has been proved by experiments, on all kinds of horses, with all sizes of loads, and on every kind of road, that the power of the horse to draw is greatest when walking about three miles an hour, and that for every addition of speed beyond this the load has to be lessened in a much greater ratio than the speed can be increased. That is if a horse be able to walk three miles an hour with a certain weight of load, and if we double this speed to *six* we require to take off *more*, considerably more, than half the load that he may do so; so that instead of the *running with nothing* way in which the draught horses in this country are commonly worked being a gain, it is a positive loss; both *immediately* of labor, and *permanently* in the destruction of horseflesh.

I plead not for the pampered pleasure horse, to whom it is a relief to be allowed to run away; nor for the more useful hack, the nature of whose work necessitates a given space within a limited time. To him the best compensation we can give is to shorten his stages. But for the horse whose regular daily labor is draught; I do maintain that he is entitled to that amount of time to do his

work in, for which nature has intended him, and that when we go beyond this, although it be to his hurt in the first place, it is to our ultimate loss.

In addition to wanting the horse for draught, we want him also to run in our stage wagons, to go to market, or to church with, or it may be to show off a little on a jaunt or a holiday. And now we must have an active, smart and good-looking horse. Then again, many people want a horse for the saddle, and as the plodding pace of the heavy horse and the nimble-namble of the light one are neither of them safe nor easy for the rider, we want a horse with strength to carry sufficient to make him safe to ride, and springiness of motion to make him easy to sit upon, and having these we care but little in this case whether he can draw or not. In addition to these uses some people want horses to run swiftly, the faster the better. Now it is very evident that these different purposes will require very different forms of animal to carry them out, and no man in his senses would think of putting the heavy draught horse in training for a racer, nor the fine limbed bit of blood to haul in the plough or the wood; yet the people of this country, those of them who have had the breeding of the horses at least, seem to have been striving after something equally unreasonable, because unattainable. That is, they have been trying to get one breed of horses to answer all these different purposes; and mark the result. They have got one, with few exceptions, not fit for any of them, a non-descript race, fitted neither to draw, to run, nor to carry.

When urging the evils of this state of things on different individuals since I came to this country, I have been repeatedly met by the answer that this is a young country yet and the kind of horses in it are the best suited to all its circumstances. We want a horse, say they, that can do a little of everything. Now I do not deny but a new country may to some extent require to tax its horses in this way, just as it does its men. The first settlers in a new country require not only to be their own hewers of wood and tillers of land, but they also often require to be their own tailors and shoemakers, their own carpenters and blacksmiths, and sometimes even their own doctors, lawyers and ministers. But then the question is, is it good for the progress of the country that this state of things should continue? Surely not. The division of labor is not only one of the main elements of civilization and social advancement in a country, but it is the very thing itself. No number of inhabitants, however many in a country, each doing a little

of everything for himself, without any regular division of employments, would ever make a country great or prosperous, and if this holds good in regard to the labor of man, it holds good in a much greater degree in regard to that of the horse, because the horse has less power of adapting himself to circumstances. While granting, therefore, that in the infancy of the Province a certain amount of *make-shift* in this respect might be allowable, I maintain that for the material advancement of the country the sooner it is got rid of the better. It is just as necessary for the profitable cultivation of the soil, for the cheap conveyance of produce from place to place, and for celerity of travelling, that there should be distinct breeds of horses for these purposes, as it is for the comfort of the person and the good government of society, that there should be different men to make the clothes, shoes and houses and to practice the professions of law, physic and divinity.

The cultivation of distinct breeds of horses for the different purposes for which this valuable servant is used, is therefore, I consider, our chief means of compensating him for the many laborious tasks we exact. In holding this opinion I am aware that I differ from a great many in this country, but I have stated it from an honest conviction, that *here*, as elsewhere, it will ultimately have to be adopted, and that the sooner it is acknowledged and acted upon by those who have the power, the better. If in any of the other remarks that I have made I have been too free with things as they are, I can only say that I have spoken of them as they strike a stranger. Familiarity will no doubt remove much of their seeming unsuitability, but if the things do not stand to reason in themselves, our being accustomed to them does not make them, in the least, less objectionable.

I have only been able, as I mentioned at the beginning, to indicate, to glance at, rather than to discuss, the various topics that the subject suggests. If I have failed to interest you, the fault is mine. The subject is one the more we would study it, the more it would open up to us, and the more we know, the more we would find we had to learn. In this respect the works of the Creator are unlike those of man. In the most perfect piece of human mechanism there is always something to desiderate, and the ultimatum of the design is soon seen through, but in material nature the farther we investigate, the greater are the evidences of design that we meet, and the more do we find to excite our curiosity, our admiration and our praise.

CATTLE DISEASE.

In previous reports, allusion has been frequently made to the lack of educated veterinary surgeons among us, and in fact, of any persons who are familiar with veterinary medicine and surgery, whether practitioners or not. Whenever our Agricultural College shall have been in efficient working condition for a sufficient length of time, it is hoped that this "plentiful lack" may be abated. The need of competent veterinary skill within reach, I have never felt more strongly than in connection with the circumstances about to be related.

It will be recollected that in March, 1862, a law was passed by the Legislature of this State in relation to contagious diseases in cattle. It was enacted with special, and I may also say, with almost sole reference to the Lung Murrain or Contagious Pleuro-pneumonia, then prevailing to some extent in Massachusetts, and which was imported from Europe; no other contagious disease of a serious character having threatened us at that time. Although several times reported to exist here, I have never had any proof of a single case of the *contagious* pleuro-pneumonia having occurred in Maine. There have been at times, for many years, cases occasionally occurring of inflammation of the lungs, and pleura, properly called pleuro-pneumonia, but never a case of the imported contagious disease which passes under that name, and there seems no probability that we ever shall have it, *unless it be brought in from abroad*;—the conditions here being such as to render it highly improbable that it will ever *originate* among us.

During more than a year past, a fatal contagious disease has prevailed in England, known as rinderpest, which originated in Russia and was imported into England from the continent. This disease proved fatal in many thousands of cases, and the percentage of recoveries where cattle were attacked, was very small. It seems for some months past to be greatly on the decline there, and hopes are entertained that they may be wholly rid of it before very long. The rinderpest differs very materially from pleuro-pneu-

monia, *being a disease of the mucous membranes, and chiefly affecting the abdominal viscera*, and not the lungs; although cases have occurred where both diseases affected the same animal, or at least, cases of rinderpest occurred where the lungs were found to be diseased, but it also appeared plainly that the subjects had been first attacked by pleuro-pneumonia. It is not known that rinderpest has ever appeared in America, but in one instance, a disease has occurred here which bore considerable resemblance to it in its symptoms and post-mortem appearances, as well as in being fatal, although no proof exists of its having been contagious.

I feel it to be a duty to call attention to the case, and to suggest a possible preventive in case it should again appear.

During the latter half of April, a disease appeared in the herd of Mr. Henry Freethy of York, York County. His herd consisted of ten. After several had died, a man, reputed a farrier, was called in from Berwick, who pronounced the disease to be pleuro-pneumonia, as he had seen it in Massachusetts some years ago. The selectmen then notified the governor and myself of the existence of a disease suspected to be contagious. I received the letter on the 11th of May, and the next day about noon was in York, but found the last sick one had died the day previous, making six. The remaining four appeared perfectly well. Inquiries regarding the symptoms and the post mortem appearances of two which had been examined by physicians of the place, satisfied me at once and fully, that it bore no resemblance to pleuro-pneumonia. One might as well mistake dysentery for asthma, as this for that. But they painfully suggested the possibility of rinderpest. Fortunately, the cattle had been kept close at the barn from the first, and as soon as infection was suspected, a rigid isolation was intentionally and judiciously kept up.

As nothing more then appeared needful to be done, I directed the premises to be disinfected and complete isolation to be continued for some weeks. Returning home, I read what my library furnished regarding the peculiarities of rinderpest, the effect of which was to increase my anxiety.

On the 16th, information was received of two more cases, and the herd was again visited. On seeing the cattle, I recognized or fancied that I saw characteristic symptoms of rinderpest additional to what had been reported to me on the first visit, and little was found distinctively different. The animals were both killed. The

morbid appearances corresponded substantially with those reported abroad; the differences not being greater than between the accounts lately from England and those given by Prof. Simonds in his report several years since of observations made on the continent.

Briefly, the symptoms were as follows:—The first which was noticed was described as “tremblings.” What I saw was a continuous twitching of the muscles of the fore-shoulders, occasionally extending to the flank, with now and then a tremor. These twitchings grew fainter as the disease progressed, and nearly or quite ceased before death. Watery eyes appeared very early, and before long, in most cases, they had a heavy look, with swollen and drooping lids. In one case a film appeared at a late stage. At first the dejections were natural, then diarrhoea set in which soon passed into dysentery, with fluid and very dark discharges, not very offensive, and some blood. Tenesmus frequent. Urine very deep colored and passed with difficulty. Temperature variable; at first feverish, especially about the horns, then colder. Coat staring. Rumination irregular and soon suspended. Some appetite for a day or two but not later; water was freely taken at all times. Pulse feeble and quick; after two days could hardly be felt. Respiration short and quick. In more than half there was a thick discharge from the nose. With several a sickly smell was noticed. In no case was there any moaning, violent motions, or any other indication of acute suffering, but in all a rapid prostration of strength and loss of vitality. Death ensued in from three to six days, one living until the ninth day.

The morbid appearances were: windpipe inflamed (this was noticed equally in one which showed no discharge from the nostrils); lungs and heart healthy; liver, spleen and kidneys but little affected; rumen (paunch) healthy and ingesta natural; contents of omasum (manifold) rather hard and dry, but not very much so. The passage from this to the abomasum (or fourth stomach) was highly inflamed, as well as the lining membrane of the whole of the fourth stomach and of all the remainder of the alimentary canal. The gall bladder was distended to unusual size, and its mucous membrane much inflamed. The lining membrane of the bladder exhibited a high degree of inflammation, and its color was rather darker than of the others. The chief seat of the disease appeared to be the fourth stomach and intestines. The lining membrane of these showed an unusual lilac or pale purplish hue.

Now these symptoms and morbid appearances correspond almost exactly with those described by Prof. Simonds in his elaborate report, to which reference was made, and from which extracts were given in my last report, (see page 106 et seq.) the principal difference being the absence, in the cases of York, of pimples or ulceration in the mouth, which occur in many cases of rinderpest. A description of the disease having been submitted to one of the best veterinary surgeons in the country, Dr. E. S. Thayer of Boston, he said it closely resembled rinderpest as reported, and was unlike any which had fallen under his observation, and he expressed a desire to be advised of the fact should other cases occur, as would probably be the case should it prove to be the veritable rinderpest.

Now in regard to the suggestion of a possible preventive. In Prof. Simonds' report occurs the following:—"It is evident that the morbid matter on which it depends having entered the system . . . soon acts upon the blood, by converting some of the constituents of that fluid into its own elements," &c. If this be so, rinderpest belongs to the class known as "zymotic" diseases;—in which progress is made by healthy atoms being converted into diseased ones by catalytic action, in a manner analogous to the changes which take place in fermentation. Now it is well known that the alkaline sulphites will immediately arrest fermentation, and, according to a late alleged discovery of Prof. Polli, of Italy, they also arrest morbid action of the sort above indicated. It occurred to me that here might be an opportunity to test their efficacy. Accordingly, on my second visit, I took a quantity of sulphite of soda and requested the owner to administer small doses twice daily to the remaining beasts, which he did—and the plague stayed—whether in consequence of giving a harmless salt, or merely coincident with it, I cannot tell.

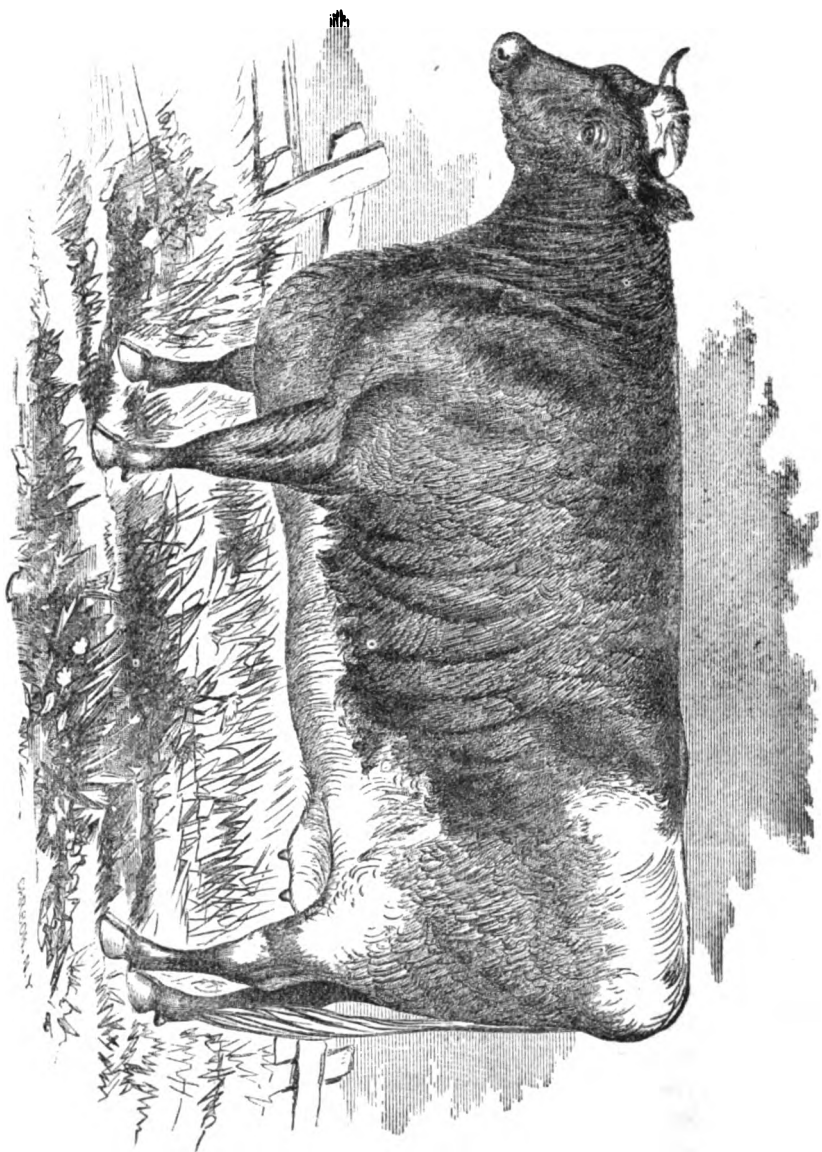
I heard nothing more of the case until the 7th of August, or ten weeks subsequent to the last case in May, when notice was received of another and I went again and found one of the two remaining, (out of the ten first named,) to have died the day previous to my arrival. Mr. Freethy expressed much confidence that had the supply of sulphite first left been sufficient to allow its having been given a little longer, the case would not have occurred. More was procured and given to the one left, as well as to what he had meanwhile purchased, and I have heard nothing further up to the present writing, (the second week in December.)

It appears from recent advices from England that the sulphite of soda was used by several parties in England during the past season, and no case is known to have occurred where it was administered *as a preventive*. When given after the disease had made some progress, it failed to save the animal.

STRUCTURE, FUNCTIONS AND DISEASES OF THE UDDER OF THE COW.

When one calls to mind the great benefit derived by mankind in almost every stage of civilization, from the milk of the cow, he can not fail to admit that a knowledge of the structure and diseases of the organ by which that wholesome and nutritious fluid is secreted, is a subject of much importance. Inflammation of the udder, commonly called garget, frequently occurs, and is often injudiciously treated, and attended with very serious results. With the hope that it may contribute to a more successful management, I quote below, from an essay read before the Edinburgh Veterinary Medical Association by R. D. Brotherton. After some preliminary remarks, he thus describes the lactiferous organ of the cow, considered in relation to its structure and functions:

“The mammæ or udders (commonly called the bag), are those large glandular bodies that are pendulous under the postero-inferior part of the abdomen, between the thighs, in their distended state reaching anteriorly within a few inches of the umbilicus, and posteriorly as far back as to be almost on a level with the tendons of the gastrocnemii muscles. The aptitude of this situation is sufficiently evident to us all as being most convenient for the calf, offering the least hindrance to progression, and being most securely protected from external injury. Of all the animals in the class “mammalia,” none are possessed of mammiferous glands of such an immense magnitude (in proportion to the size of the animal) as the cow. I am not prepared to say whether or not the domestication of the cow, and the apparent perversion of lacteal secretion from the use for which it was originally intended, may not in a great measure have contributed to the large size of this organ. One fact, however, would appear to contradict this opinion, and to prove rather that nature has not only intended them in this animal to furnish elementary food for the support and continuation of the mother’s offspring, but also to answer other purposes, by supplying man with a highly nutritive and pleasant beverage—from the



BIRTH A.

Ruan, bred by Samuel Thorne, Thordale, Washington Hollow, N. Y.—the property of Bardett Loomis, Windsor Locks, Conn. Calved March 5th, 1859
 Got by Duke of Thordale (2787.) Dam, Glaciers, Bloom, by imported Duke of Gloster (11382.) & dam, Bloom, by Sir Leonard (11827.) & dam, Elvira, by
 Solus (3733.) & dam, Golden Pippin, by Belvedere 2d (3126.) & dam, by Alive, O. (2393.) & dam, by Ellipse (236.) & dam, by Mr. Charles's Gray Bull (572.) & dam, by the Paddock Bull (477.) & dam, by Browne's Red Bull (57.) & dam, by
 received first prize and sweepstake medal as a three-year-old cow at New York State Fair in 1862, also first prize as two-year-old, at Purchase Co. Fair, in 1861

well-known fact, that although the lactiferous secretion in most other animals very soon ceases after the withdrawal of their young, and along with them the maternal sympathy, yet, in the cow, the functions of this gland are not for a considerable time interfered with, even if it may *never* have been subjected to the great exciting cause of the secretion—the presence and suckling of its offspring. I may also mention that the size of the organ is various, depending upon the age, breed, and time of parturition, and also in a great measure upon the frequency of the demands made upon it for a supply of milk; the health of the animal, and the nutritious quality of the food, combined with other circumstances, will have a tendency to augment or lessen its volume. The period also at which this lacteal secretion for the first time commences, is dependent upon circumstances—some breeds, as the French, Alderney, and others, being generally put to the bull from ten months to two years old. There is also, as is well known, a variety in the composition of the milk—some abounding in the butyrous, and others in the caseous principle—what some are short in quantity, is made up by its superiority in richness of quality. This may be accounted for by constitutional peculiarities, or by the greater energy of the functions of assimilation. The chemical analysis of milk furnishes us with the following contents, according to Berzelius:—

Water,	928.75
Curd, with some cream,	28.00
Sugar of milk,	35.00
Muriate of potash,	1.70
Phosphate of potash,	0.25
Lactic acid, acetate of potash, with a trace of lactate of iron,	6.00
Earthy Phosphates,	0.30
	<hr/>
	1000.00

“Thus, we perceive that milk is a compound fluid of an aqueous, caseous, and oleaginous nature, a fact easily proved by the spontaneous decomposition which it undergoes when allowed to stand in a vessel. From the fact, also, of its containing substances which are found in the chyle and not in the blood, many physiologists (among whom we may mention the immortal Haller,) have been led to infer, that the materials of which it is composed are

supplied to the mammaræ from the chyle *by the absorbant system*. The resemblance, also, between the milk and the chyle may appear to favor this opinion. Many other hypothetical arguments are advanced in favor of this theory, but I think that the following statements are sufficient to prove it erroneous, and to establish the fact that the blood itself furnishes this (as well as all the other glands) with the requisite material for secretion:—1st, No anatomist has as yet discovered or described any lacteal vessels coming from the mesentery to the udder; 2d, Purgation of the suckling cannot be produced by any medicine administered to the mother, *unless this medicine is quickly absorbed into the circulation*; 3d, The fact of injections passing from the arteries into the excretory ducts of the glands; 4th, When the discerning powers of the gland have been exhausted, *blood* has been drawn from the teat; 5th, From analogical reasoning or deductions, we may infer that as nature does not frequently deviate from her usual laws for trifles, the mammaræ, with every other gland (the liver excepted), is furnished with material for secretion by the *arteries*.

“Previous to making any remarks on the function of secretion, it will be requisite to glance at the general anatomical structure of the udder; and, beginning from without, notice first what we find *externally*. In common with the other parts of the body, the udder receives a covering of the common integument, but of such a character as to be able to adapt itself to the changes in size which the organ undergoes, being soft, pliable, elastic, and but partially covered by long and soft hair. In shape it is imperfectly hemispherical, and artificially divided (externally) by the skin into four quarters, and to each quarter hangs an appendix called the papilla or teat, giving it very much the appearance of a round-surfaced funnel. If the quarters differ any in size, the two anterior are generally the larger.

“The teat is an inverted cone, formed from a continuation of the covering of the udder, but having more cuticle on its surface, to prevent the effects of friction to which it is exposed from suckling or milking. Its dependent portion is contracted, and each teat is perforated by an opening that communicates with the interior of the gland. Some few muscular fibres also are found in its substance, which, together with a kind of valvular apparatus in its internal part, formed by the cuticle being continued up the sides of the perforation and then terminating in an abrupt or corrugated manner, where the contraction ceases, will assist in preventing the

column of milk escaping spontaneously, which we sometimes have witnessed in large and full udders, the weight of the fluid overcoming this provision. Thus we perceive by what a simple and easily-formed contrivance *nature* manages to overcome what would to us be great obstacles, and what perhaps would have puzzled some of our best mechanics to have discovered—so simple, yet so effectual in its design.

“Proceeding inwardly, and immediately under the skin, we find an intervening cellular tissue, uniting loosely but firmly the skin to an expansion of elastic fascia, by which the gland is enveloped, rendering it stronger and more compact. This fascia and cellular membrane also detach several portions into the interior of the glandular structure for the same purpose. In this glandular structure, as in other secerning organs, we find arteries, veins, absorbents, excretory ducts, a small portion of fatty matter, and cellular tissue; but of the intimate arrangement and disposition of these various tissues, but little is as yet known. The udder being a conglomerate gland is formed of numerous lobules united together by cellular membrane. Each of these lobules is principally constituted of arteries, veins and ducts, and though almost too small for demonstration, yet we infer that each lobule is a small gland that performs as perfect a secretion as the whole accumulated glandular mass. The minute structure and disposition of these lobules has given rise to as much anatomical disquisition as that of the arrangement of the air cells in the lungs. Neither can we admit that microscopic investigation has placed us on a surer footing in this respect; in fact, the primary and essential modes in which all bodies are composed and arranged, is a subject beyond the grasp of the human intellect, however laborious, inquisitive, or penetrative its researches may be; and whatever unwillingness may be manifested by an interrogative aspirer prior to his subscribing an assent to the declaration—“thus far shalt thou go, but no farther”—still the simplest and most uncomplicated structure in the field of nature presents us with something inexplicable, if our inquiries are pushed to their furthest extent.

“The question has frequently been put to me, where or in what is the milk contained previous to its abstraction from the udder by the teat? The plebeian will tell us in the *milk veins*! And, to be candid, how many of us are there who did not in former years harbor this opinion, having (no doubt) received it by *tradition* in our youth? But when “philosophy throws away the veil that

exists between nature and the ignorant," then false notions, however closely they may be clung to, must give way to those ideas obtained from our own examination and judgment of structure and function.

"But lest you should charge me with flying off from my subject at a tangent, let me proceed to make some few remarks on those canals in the interior of the udder which contain the milk. No doubt you will recognize them under the name of *excretory ducts*, and it must at once strike you that they must be very numerous and capacious, in order to hold from six to eighteen quarts of fluid.

"These ducts are supposed by some to be continuous with the minute ramified terminations of the arteries that supply them with fluid; by others, that between those terminations and the commencement of the ducts some structure is interposed, through which the blood is infiltrated and changed; whilst it is the most general, and I think the most probable opinion, that in the substance of the organ are many areolæ or cells, in the interior of which the arteries ramify and deposit the milk, which is conveyed by the excretory ducts into larger receptacles, with which the gland is furnished, whilst the superabundance of blood and the "residuum of secretion," are carried again into the circulation, the former by the veins, the latter by the lymphatic vessels. The shape and disposition of these excretory ducts are not unworthy of our notice. In shape they bear considerable analogy to the papillæ or teats. We previously noticed that the teat is so formed as to prevent the loss of milk by gravitation, but if there were no other provision against this, the weight of the accumulated fluid must inevitably overcome it. But nature always adapts her means to the desired end, and has in the interior so formed the canals as to resist the pressure from above, by the converging terminations of smaller into larger ducts, being, like the teat, contracted, and provided with a valvular fold of the lining membrane. The same law is also observed throughout, to the communication of the ducts with the teat. The canals do not, in an uniform manner, keep growing from a smaller to a larger size, but in various parts of their course are considerably dilated. These dilatations or sacs answer the purpose of reservoirs, have their inferior portions contracted, and are placed in an oblique direction, are provided with valves, thus preventing the accidental loss of milk, and also its retrogression. On this account it is necessary that the teat should be elevated, and the udder gently pushed upwards in the operation

of milking, in order to open the valve, and dislodge the milk. Were some of our dairymaids to take a lesson from the calf or colt on this subject, and mark how they instinctively, and with pleasure to the mother, obtain the milk from the gland, we should not have so many vicious cows, so many diseased udders, or sore teats."

He then goes on to speak of the Symptoms and Treatment of Inflammation of the Udder of the Cow, as follows:

"Having briefly run over the general anatomy of the udder, we shall be better prepared to consider it when in a morbid condition. Although there are few organs in the body more liable to disease than glands, yet how few pages in our veterinary pathological works do we find devoted to their consideration? The reason why we do not see a larger number of these cases, may arise from glands being but low in the scale of sensibility, not receiving a large supply of sensitive nerves, thus preventing the animal from manifesting symptoms of pain. We have frequently seen the liver, spleen, and other glands almost disorganized in consequence of previous disease, and yet the animal has never been noticed to evince the effects of pain. Inflammation of the udder (or, as it is commonly designated, '*gargel*,') is a disease of frequent occurrence in milch cows, most commonly sudden in its attack, rapid in its progress, and often productive of irreparable injury. It may have its seat in the glandular or cellular structure, but frequently involves both these, as well as their cutaneous covering. The symptoms are these ordinarily produced by inflammatory action, and are so palpable as scarcely to require mentioning. We shall find heat, swelling and pain, with derangement of function in the gland, and not unfrequently more or less constitutional disturbance. The disease generally commences in one quarter of the udder, which becomes hot, enlarged, and has a peculiar hard and knotty feel. But as inflammation is very apt to spread where there is continuity or contiguity of membrane, the other quarter; or perhaps the whole udder, becomes involved. The milk is considerably reduced in quantity, and of a yellowish color, by the admixture of serum and lymph, which becomes coagulated, and gives it that curdled appearance so often witnessed in these cases. As the disease advances, we shall find that the secretion of milk is entirely suspended, and that in its place blood, lymph, or pus, is effused in the interior of the lactiferous tubes. When the cellular texture is chiefly involved, we shall find considerable tension of the skin, in consequence of effusion having taken place in the cells, and very

often in these cases there is puffiness of one or both of the posterior extremities. In other cases, the skin will exhibit indications of erysipelatous inflammation, appearing red, and the redness temporarily disappearing on pressure being applied to the surface by the finger. The swelling and consequent tension are not to a great degree prior to the vessels unloading themselves by effusion, which they may do on both surfaces. After this has taken place, the redness and acute inflammatory action ceases, and then the skin assumes a yellowish tint. But when the internal structure of the gland is affected, it is by far the most dangerous in its consequences, and the most difficult to treat. With the local inflammation we have always more or less constitutional or sympathetic fever, varying in intensity according to the degree of nervous and vascular excitement caused by the local irritation. We may also notice that the subcutaneous abdominal or milk veins are generally distended, the return of the venous blood being impeded in consequence of the swelling.

"It may be observed that the cows yielding a large supply of milk are most liable to this disease, and it has taken place in heifers, from being in too high condition, even previous to their ever having given any milk, and cows whose udders have been dry for months are not exempt. The causes of this complaint are numerous, and it is very often complicated with the epizootics that prevail in some seasons of the year, and in certain localities. We shall divide the causes into those that place the organ in a state of susceptibility for the attack, and hence called the *predisposing*, and those that are the immediate agents in its production, generally called the *exciting*.

"I have seen the disease attack cows from being put into too luxuriant a pasture, either soon after the suspension of lactation, or when near the time of parturition, and particularly those that are unaccustomed to the climate. Neglect of abstracting the milk, or the operation being performed in an improper manner, may also be included. The sudden commencement of the secretion, or what is called the 'springing' of the milk, calling for a large influx of blood into the vessels, or badly drying up the gland, and leaving portions of milk to be absorbed into the system, are frequent causes. Exposure to cold and wet in the field, cold currents of air coming in contact with the animal in the cow-house,—the animals standing with their legs or udder in a pit when drinking, may also induce the disease. The exciting causes are external injuries,

such as the viscus being gored by another cow's horn; being kicked or trodden upon when standing or lying in the cow-house; bruising the udder by lying carelessly upon it; having too little straw under it, or by lying out in the autumn, amongst cold and wet grass. Permitting the udder to be loaded and distended by an accumulation of milk, and the practice of 'heifting,' are frequent causes. I once saw the disease produced by a youth being in the habit of inserting straws in the teat to draw off the milk. Professor Dick also mentions that it may result from cow-pox. Disease of the teat and obstruction of its perforation, by not allowing the milk to flow, but to lodge in the ducts, which will act as an irritant, and produce inflammation, in the same manner as retention of urine causes cystitis. From the well-marked sympathy between the udder and the uterus, the irritation caused in the latter by the retention of the placenta, will frequently extend to and involve the former in disease. Derangement of the maniples and abomasum, or of any portion of the alimentary canal, will frequently cause disease of the udder. In fact, it appears to me that the causes inducing an inflamed state of this important viscus, are far more numerous than have generally been supposed by what few authors have written on the subject.

"Garget assumes both an acute and a chronic character, and this distinction will, to a certain extent, modify the nature and application of our remedies. It may terminate in resolution, suppuration, obliteration by condensation and induration of the glandular structure, and in gangrene. But, properly speaking, these cannot be called its ultimate terminations (with the exception of the first,) but rather its consequences—as the inflammatory action may still be existent in some of the surrounding portions of the gland, whilst there is suppuration and mortification in the other. Restoration and death, in my opinion, are the only two ultimate terminations of disease.

"The *treatment* must at all times be moderated by the nature and intensity of the symptoms exhibited, and will in a great degree be influenced by the cause that originated them. We must first endeavor to discover whether there is any immediate exciting cause still in operation, as the lodging of thorns, or of splinters of wood, accumulations of milk, or obstructions to its flow, and our first indication will be to remove these. If the udder be distended with milk, let it be withdrawn either by gentle manual operation, by permitting the calf to suckle, or if these give the animal much

pain, by the introduction of a mechanical apparatus in the form of the teat canula, or the tabular portion of a common quill, into the teat, through which the milk will gradually gravitate. The removal of these exciting causes simply, will very speedily produce a mitigation of the symptoms, and afford the animal considerable relief. In some parts, from some popular *belief*, or perhaps *disbelief*, the farmer refuses to draw off the secretion before the parturition of the cow, although the udder may some time previously have been distended, almost to bursting; but this must be insisted upon, or bad consequences are likely to follow its neglect; and if the function of secretion is very vigorous, let the fluid be more frequently abstracted. On the same principle, any offensive or irritative matter in the uterus must be removed; and if the stomach or digestive canal be suspected, let them be regulated by cathartics, tonics, or stimulants, as circumstances may require. If after having got rid of the exciting cause, or if its removal cannot be effected, the inflammatory action proceeds unabated, we must have recourse to decided antiphlogistic measures. Of these the ancient practice of bloodletting stands the foremost, and is absolutely necessary when the local inflammation and the constitutional disturbance are great. In this case we shall probably find the animal with a quick pulse, laborious respiration, anxious countenance, costive bowels, diminished appetite, suspended rumination and lactation, and manifesting general nervous excitement and great pain.

"According to the violence of these symptoms must be the energy and extent of our general treatment, in order to check their rapid progress, and to prevent their fatal consequences. No law can be laid down as to the exact quantity of blood that circumstances may render it necessary to abstract,—the general symptoms, the state of the *pulse*, the general plethora of the system, the age, strength, &c., &c., of our patient, must be considered as guides on this point. It is the effect, and not the quantity of blood that we wish to obtain. From four to eight quarts may be stated as the general quantity required, taking care that it is abstracted in a full and free stream, in order that we may make an impression on the force and activity of the circulation, by giving it a sudden check, and prevent the vascular system accommodating itself to the gradual loss of blood drawn by a small orifice, which reduces the bodily strength, while it does not alleviate or prevent the determination of blood to the suffering organ. It is of no importance which vessel we chose for this purpose, the jugular

or the subcutaneous abdominal vein ; but I give a preference to the former, having in many instances found a difficulty in pinning up the latter after the operation, and also, from the looseness of the integument, the cellular membrane under the abdomen is very liable to sanguineous infiltration from the orifice of the vein. As there is congestion or determination of blood in an inflamed part, it would be advisable, if *practicable*, to detract blood locally from its immediate vicinity. This is generally done by leeches, scarifications, or incisions ; but unless in those cases where the inflammation is superficial, as in the cellular membrane or skin, I do not see the propriety of their use. Incisions through the integument in a longitudinal direction have been of service where the skin is principally involved, when there is much tension and subcutaneous serous effusion. By this means the distended vessels are unloaded, the serous effusion evacuated, the tension relieved, and the disease is gradually drained away by the suppurative process which follows. But we would only recommend incisions after other local and constitutional remedies have failed. Blood-letting must be followed by the administration of a cathartic, the importance of which in cattle practice is well known. The following is the formula we generally adopt : Epsom salts, from half a pound to a pound ; sulphur, quarter of a pound ; caraway seed and ginger, two ounces of each, mixed in a quart of warm water, to which may be added a little molasses, to render the drench less irritating to the superior part of the air passage. By these means we shall not only cause evacuation of the fœcal contents of the intestines, but also get rid of a large portion of the thinner part of the blood by secretion and excretion, stimulating the functions of the liver and skin, restoring the balance of the circulation by determining blood from that organ which already possesses too much, to other parts of the body, and will be an important adjunct with blood-letting in lessening the morbid susceptibility of the diseased part, and in promoting a healthy state of the organ.

In the subsequent treatment, sedatives, tonics, or diuretics may be given, according to the degree of fever or debility that may supervene ; but it will seldom be found requisite to do more than keep the bowels in a regular state by small aperient doses. Muriate of soda (common salt) is objectionable as a medicine in this disease, as it has a greater tendency than other *cathartics* to retard the secretion of milk.

"After having combated the constitutional symptoms (if any,) our next object must be to remove the local inflammation, for which purpose we use direct applications to the part itself. Amongst these, hot fomentation is perhaps the most *beneficial*, where the inflammation is established in its most acute form. It may be with water as hot as a person can bear his hand in, and the temperature kept up, or the water may be medicated to suit the fancy of the proprietor,—as it is the heat and moisture which are of utility in allaying the irritation, by relieving the deeper seated nerves from pressure, causing cutaneous transpiration, relaxing the vessels, and promoting effusion. If that benefit does not arise from this remedy which is expected, it is frequently because the fomentation is not persisted in a sufficient length of time, or for want of water of sufficient heat. Four times in the course of the day, and an hour each time should the application be made,—having a large vessel, continually supplied with water of a proper heat, placed under the cow, and a person on each side of the udder, who, with a large woollen cloth dipped into the water at intervals, and applied to the udder, so as not only to foment, but to suspend it. A poultice of bran or linseed may then be applied, but are rather objectionable on account of their weight. The udder may also be suspended by a broad bandage passing from beneath it to the loins, with a slip posteriorly between the hind legs, to meet the other at an angle. This will assist in relieving the pain, and prevent the weight of the udder causing such an increased determination of blood to the part. I would not recommend any stimulating application until the violent inflammatory action has somewhat abated by the preceding treatment, which may be repeated, or carried to its fullest extent, as circumstances may require. After the more active stage has been somewhat subdued, a cooling liniment may be rubbed on the udder after the fomentations. Any of the following may answer:—Acetate of lead, 2 drachms; water, 1 pint; neat's foot or olive oil, 1 pint;—shake, when a saponaceous fluid will be formed. This I have found to answer well in many cases. Solutions of the acetate of lead, of nitre, or of sal ammoniac, in water, with vinegar or spirits of wine added, are often made use of, according as a cooling, evaporating, or discutient lotion may be wanted. Ointments are also recommended by some practitioners, but are more applicable to a chronic stage, as the friction necessary for inunction will tend to irritate a glandular swelling in its acute form. They

may be used where stimulants are required, in order to remove the stagnated blood, by rousing the dilated vessels into action. Camphorated elder ointment, with a little mercurial ointment added, is recommended by Mr. Youatt. Camphorated spirits, with oil of organum, or olive oil, turpentine, and camphor, or lime water, linseed oil, and spirits of turpentine, in varied proportions, will form liniments that may be well rubbed in, when the tenderness of the part is removed, but swelling remains. As I live on the sea coast, I have been in the habit of using decoctions of seaweed (commonly called tang) in sea water, and have found it of use in removing the swelling left after an acute attack. Perhaps it may act on the absorbents, from the portion of iodine that the seaweed contains. Iodine ointment is a good application.

"We must not forget to have the udder emptied of its contents two or three times in the day, by being milked, if there is no obstruction, or much tenderness in the teat. If the latter be the case, the tube already mentioned had better be used, as the disease may be increased by the irritation of milking by the hand, caused in the diseased teat. It will sometimes be found necessary to make a longitudinal incision into the teat, in order to remove the coagulated milk or blood from the termination of the ducts, which may be done by the introduction of a probe. The animal should be kept as quiet as possible, and have thin gruel, malt, or bran mashes, with a little sweet hay, and chilled water. If, however, all the means to which we have resorted should fail in producing what is most to be desired—resolution of the inflammation—the attack may proceed unsubdued, and produce suppuration, abscess, gangrene, or even death itself, by the violence of the symptomatic fever. If the swelling, fever, and pain increase, the bleeding and purging may be renewed, and the fomentations continued, if the animal can bear further depletion. In some cases large effusions of serum will take place, and form dropsical tumors in the vicinity of the udder, or immediately under the integument enveloping it. These must be evacuated by the lancet, and treated by emollients in order to induce suppuration. Setons, also, may be inserted in the surrounding parts, which may cause revulsion, and act as drains. If the discharge from the udder be great, debility may be the consequence, when recourse must be had to gruel, port wine, and the vegetable tonics, or if there is no debility, diuretics may be of service.

Suppuration frequently takes place either in the subcutaneous

cellular tissue, or more commonly in the interior of the glandular structure, at the central part of the consolidated lymphous deposit from the vessels, which causes that hard and knotty feel of the udder under inflammation. When superficially seated, the presence of pus may soon be detected by its naturally tending to the surface; we must not permit its spontaneous evacuation, but give free vent by a dependent incision with the lancet or bistoury, and thus leave a clean-edged wound, which may afterwards be treated by astringent washes or injections. But when suppuration takes place in the interior structure, it is often productive of serious results; being deeper seated, pus does not readily reach the surface, but burrows in various directions, by means of the lymph forming canals around the circumference of the pus, called sinuses. These sinuses may be numerous, and ramify in various directions through the inner structure, and three or four empty themselves into one, which, on attaining the surface, bursts and discharges a purulent unhealthy matter. The existence of these sinuses, and the constant discharge (which must be great from many of them) soon weakens the animal and disorganizes the udder. The fistulous ulcers thus formed, or those formed by the bursting of the abscesses, are difficult to heal, and should if possible be prevented by allowing previous evacuation to the matter by the lancet at that point in which it is preparing to burst. If, however, the case has been neglected, if abscess, sinuses, and ulcers have formed, from the danger of gangrene, and from the weakening of the constitution, we must have recourse to antiseptics and tonics, and endeavor to obtain a healthy action of the parts by the application of a solution of the chloride of soda or lime. We may insert a piece of caustic potash in the sinuses, or inject them with a solution of corrosive sublimate, in order to obliterate their canals and suppress the unhealthy secretion. Should this treatment succeed, it invariably leaves the gland in an indurated state, and stops further secretion from the quarter which was affected. In some cases, where the intensity of the inflammation is such as to cause a complete stagnation of blood, and consequent stoppage of circulation through the vessels, the part, from want of nutrition, loses its vitality or mortifies. The affected parts will become cold, black, insensible, and have a foetid smell. Incisions may be made into it with a sharp instrument, but no blood flows, and the animal evinces no pain. Large sloughs are occasionally detached and fall off, while the surrounding parts are soon all involved if its

progress is not immediately checked. This can only be done by the removal of the dead and dying portions by a surgical operation. In performing this operation the principal objects to be borne in mind are—1st. To remove every portion of the dead part. 2d. To leave a sufficient quantity of integument so as to allow the edges to be brought together by suture. 3d. Properly to prevent bleeding by securing the mammary arteries by ligature, and some other smaller branches by ligature or torsion. The nature of the incision will depend upon the extent of disease, and the after treatment will consist in supporting the parts by a bandage, and in keeping up the strength of the animal as much as possible by the means we have already mentioned, keeping the wound clean by simple dressing, and promoting adhesion or granulation according to the indications presented. This is the only means, under these circumstances, of saving the animal's life, and of giving the owner time to make her serviceable by feeding for the knife. This operation has been successfully performed by Professor Dick and by Mr. Bowie, and by other veterinary surgeons.

“ We have now but a few remarks to make on chronic inflammation of the udder, and on one of the consequences of the acute, viz., induration of the gland. The chronic inflammation is but a sequel of the acute; there is little or no pain, generally swelling and hardness, but no heat. The milk is lessened in its quantity, the animal's appetite diminished, but little or no constitutional disturbance is present. If not removed, the secretion of milk gradually and slowly ceases, and the affected portion is called a ‘blind pap.’ It is often very difficult to restore it from this chronic and indolent state to its wonted vigor, although much success has attended the use of iodine and its compounds. It is a very useful application to glandular enlargements when of long standing, and is the most to be depended upon in induration of the udder. It is used both internally and externally. For external use, 2 ounces of the tinct. iodine mixed with 2 ounces of soap liniment will form an embrocation, or 1 ounce of the iodine to an ounce of lard will form an ointment, which, if well rubbed on the diseased part, with plenty of friction, will frequently succeed in causing absorption of the tumors. The iodine in half-dram doses may be given internally. A respectable authority recommends the internal administration of hydriodate of potash. I have given it both to the cow and the horse in 4-drachm doses, without any other than a diuretic effect. If this is the effect that is wanted, we have better and

cheaper diuretics in our pharmacopeia. I also think (and that from experience) that the ointment of hydriodate of potash is far inferior to those made from iodine itself, or from some of its compounds with mercury. In chronic garget the use of these remedies must be continued twice in the day, and often for a considerable time, before any benefit is derived, taking care that we do not cause absorption of the gland itself.

The induration of the affected quarter or quarters is a very frequent consequence of garget, in which case we have obliteration of the functions of the gland, with the restoration of the animal's health. This is produced by a cessation of the inflammation, and a subsequent consolidation of the cellular and secreting textures of the gland. It is seldom of a malignant nature, like cancer, but remains stationary and indolent throughout the animal's life, producing no irritation in the surrounding tissues. When this is the case, no treatment is necessary, as it cannot be cured. If the tumor, however, should put on a malignant character, which it sometimes does, in consequence of being roused by external injury, in which case renewed inflammation is set up in the surrounding parts of the adventitious deposit, that which had hitherto been harmless now spreads with rapidity and involves the other structures, which become converted into a substance like itself. Ulceration and suppuration frequently supervene; and if the whole malignant substance is not removed by operation, death must inevitably result from the great excitement of the system. But as this is not a common result, we look upon induration as that consequence of inflammation most to be desired after resolution. It detracts from the value of the animal as a milch cow in proportion as one or more of the quarters are thus affected, but it does not prevent her from being consigned as a feeder. I may also mention that numerous instances are known of those quarters of the udder, thought to have been thus obliterated, again secreting after a succeeding parturition; but I think that another quarter more frequently becomes dry, than that one in this state again resumes its function."

THE COLLEGES FOR THE INDUSTRIAL CLASSES. CONTEMPLATED BY THE ACT OF CON- GRESS OF 1862.

During the past year, several communications appeared in the *Maine Farmer*, which comprise the results of a more thorough and exhaustive examination of their subject matter, than had before fallen under my observation. Desirous to give them a wider circulation and a more permanent form, they are, with permission of the author, embodied in the State Agricultural Document of the year.

“AGRICULTURAL SCHOOLS.”

MESSRS. EDITORS :—You copy, in the last *FARMER*, an article under this title, from the newspaper called *The Nation*. As you thus give currency, if not approval,* to the views put forth in that article, I respectfully submit, that those views are entirely incomplete, and therefore unserviceable, in their supposed application to the new question of “the liberal and practical education of the *industrial* classes” in *this* country, and especially in this part of it.

The chief assertions of the writer in the *Nation* are to the effect, that the agricultural schools of Germany, after the experience of fifty years, are now regarded with less favor than heretofore,—that “strong objections” to them are developed—that it is now coming to be thought better to establish agricultural chairs or professorships, at the great universities—that, at Halle, such a professorship was established three years ago, and that this new department has many students—that a similar professorship was established at Leipzig last year—that the “richer universities” have collections, apparatus, libraries and cabinets superior to the agricultural schools—that there is no need of large farms to teach the practical details of the farmer’s business—that it is enough to teach the general *principles* of the sciences at these splendid universities, and that agricultural *practice* may be learnt at home, &c.

* The editors of the “*Farmer*” expressly disclaimed such approval.

How much of this may be new and true, as regards Germany, I have not the means of knowing—but precisely similar assertions, put into the form of general argument, are, unfortunately, not new here. Ever since the Congressional endowment was granted in 1862, the air has been full of this kind of appeal in favor of the existing universities and colleges, as against separate “practical” schools for the “industrial classes.”

But there is a broad and deep question, which the writer in the *Nation* leaves wholly untouched—one which controls the whole problem in Germany, as it does also, though in another direction, in the Northern States of America. To what sort of population is it, that the German universities are adapted? Are the populations of the German States homogeneous, and all substantially of one grade, like ours in Maine? Or are they deeply and unchangeably divided by distinctions of rank, and class, and *caste*? Is there not there, the widest and most impassable distance, between their superior, educated classes, and the actual hand-workers in the fields?

I am not personally familiar with German life, but I suppose that generally, in Europe, the hand-workers—the *peasantry and mechanics, especially the agricultural peasantry*—are not supposed to need any except the most humble education—in some parts of Europe, not any at all. They are not expected to rise in the world, or to improve or even to change their condition. It is looked upon as a matter of course, that they shall be hand-workers all their lives, even to old age. In many European countries they never own land—do not in fact own anything, but their bodily strength, and the only profit they get from that possession, is a bare subsistence.

This class is very numerous, and many of the countries, in which they live, are populous and rich. It follows, of course, that the labor of this humble class must be directed by a superior class. The landed proprietors, by themselves, or by their stewards and overseers, employ this labor, and wish to employ it profitably. Hence it follows, that the superior classes, who are wise for themselves, desire the advantages of superior education, and, for centuries, they have had the most liberal provision and abundant means for their own general education; and now, if the statements of the *Nation* are correct, they are adding improved courses and professorships of modern science, including agriculture, to the curriculum of their ancient universities. Beyond all question,

it is from these superior grades of their society, that the new departments of agriculture, in the German universities, draw their attendants. When we hear that the German *peasants*, are leaving their fields to attend lectures at Leipzig and Halle, *expecting to return and resume their peasant life*, we shall then have a German example, that will give us something interesting and wonderful, if not something useful.

In fact, long ago, the difficulty of this great problem of *caste* was encountered even in the "agricultural schools" themselves, in Europe. In some of the most distinguished and most useful of them, they have attempted to carry them along, with two sets of pupils—one from the higher ranks, destined to be proprietors and overseers, who are not instructed in any actual work, and who pay tuition—the others, from the humbler classes, who receive a lower training, a part of which is labor, and who pay little or no fees. The difficulties of such a system are obvious enough, but they are unavoidable, in their existing social condition. A remarkable instance occurred at Cirencester in England, one of the most splendidly endowed and most promising agricultural schools in Europe. [One or two statements of detail were here made, in the original article, which were found to be erroneous. The correction appears in the second article.] This really fine institution, with admirable appointments of every kind, including very distinguished professors, whose names are seen, every day, in our agricultural books and journals, is, in fact, and has been, for a long time, in a languishing condition. But let an agricultural chair be established (if such a thing can be conceived) at Oxford! or Cambridge! and filled by a man of note as well as ability, and without doubt, a very respectable number of the sons of noblemen and gentlemen, would enter their names as attendants upon the lectures.

I would not say, that it is precisely the same sort of feeling, that gives popularity to the new agricultural departments at Leipzig and Halle—for the Germans are vastly more sensible, and more in earnest about such a matter, than the English are—but, to come back to the point before stated, it will be many years, I think, before the laboring peasantry of the German States will be found flocking to the lectures of Professor Kuhn or Professor Knop.

We can make an illustration close at home. Suppose, that at any time, in the Southern States, it had been under consultation, among their public enterprises, to provide a special and higher education in sciences relating to agriculture, and that some one had

proposed to do this, by separate agricultural schools, in which the actual field laborers—the hand workers—the *peasantry* of the South, should receive superior training both in the sciences and in the practical details of agriculture—is it necessary to imagine what would have been the answer to such a proposal? Everybody can supply it. Everybody sees that the proposal would have been repelled as the grossest absurdity. The counter proposition would have rushed swift to the lips of everybody else in the consultation—“That is not suited to our condition of society; what we need is to educate our own sons—the young men of the superior race—who are hereafter to be our planters, and managers of estates, so that they can profitably direct the labor of our working class. It is not necessary that *our* young men should be trained in practical labor, and in the application of principles, by their own hands. Our object will be sufficiently subserved, by establishing agricultural chairs and scientific departments, in our present colleges and universities. This will do all that we need for gentlemen’s sons, who are to be the *directors* of our agricultural labor,” &c., &c.

Perhaps we may, at some time, obtain from the writer in the *Nation*, his view of what the difference is, essentially, between the arrangements of *caste* in a Southern State, and those in a German kingdom—Wurtemberg for example. And since a part of his argument is drawn from the case of the farmers’ school of Hohenheim, in that kingdom, where he would have us believe that things are not working well, I have gathered a few statements about that school from Flint’s very minute and recent account of it.

He tells us that, besides a “school of forestry” it was originally established, and still subsists, under the form of “distinct schools.”

“1st. The Institute or School of Agriculture for *young gentlemen*.

3d. The school of practical farming, *for the sons of peasants*.

Pupils in the higher paid (at first) \$164 for tuition, lodging and board; afterwards \$41 for tuition and room, getting board where they pleased.

The School of Practical Farming was begun with boys from *the orphans of Stuttgart* and other cities. These boys had but one instructor, who had to keep them at work, and train them to the greatest possible activity.

This practical school was modified—and, instead of taking orphans, the sons of peasants especially, were to be admitted.

The students of the *higher* institute are admitted without examination, are held to no very rigid discipline, they employ their time as they choose. Many sons of wealthy families are no doubt attracted there, by the beauty of the institution for an agreeable temporary residence.

It may be proper to remark that there is a sort of impassable, aristocratic barrier between the institute pupils, and those of the school of practical agriculture."

Every word above is quoted from Flint, who was on the spot, less than three years ago; and I submit, that the writer in the *Nation*, has no just ground for urging upon us the example of Hohenheim, (upon this fundamental question, *who* is to be educated, and *how* are they to be educated?) whether Hohenheim is working well or ill—gaining in favor or losing. If it is doing well, it is according to the Wurtemberg standard of social conditions, and class populations. If it is doing ill, the chances are more than equal, that one great reason is the fatal curse of *caste*, from which the New England populations are free.

Let Hohenheim only drop out her lower school for the sons of peasants, and then she would be exactly suited for one of our Southern States. And I submit, whether the alleged favor shown to the new agricultural departments at Leipzig and Halle, may not be simply an indication that the tyranny of caste is working the other way, and the "sons of gentlemen and wealthy families" are finding it more agreeable to go to the universities than to Hohenheim.

I had intended to carry out in this article, the other side of the question—our own side—but time and space prevent. I will resume it at another time.

P. BARNES.

Portland, Feb. 22, 1866.

AGRICULTURAL SCHOOLS—No. 2.

What I wrote, in my former paper, respecting the Agricultural College at Cirencester, in England, was set down, at the time, from memory of the accounts given by Mr. Henry Colman, President Hitchcock, Mr. Flint, and others. Referring in fact, to some of these authorities, I find that a part of my statement of detail was erroneous, but the general facts are fully confirmed, and the object for which I adduced this example, is most significantly made out.

President Hitchcock, who was there in 1850, says:

"Those residing in the building, pay \$355 annually; those who board elsewhere, \$175. Formerly, the school was open for the sons of the smaller

farmers, but could not find support on that plan, and it was found that if these attended, the wealthier classes would not send their sons. The price accordingly has been raised, and none but the sons of gentlemen, such as clergymen and wealthy laymen, now attend. None of the nobility send their children."

Mr. Flint visited the college in 1862, twelve years later, at a moment, when the professors were resigning, and the institution was in a crisis of difficulty. He says:

"A mistake appears to have been made at the outset, by fixing the charges too low. It was designed to meet the wants of those young men, sons of farmers, who wished to prepare themselves for stewards or bailiffs, and who could ill afford to pay even the £30 (say \$150) which was the amount fixed, including board and tuition. Small farmers could not send their sons, and rich ones would not."

Under a new management, he says:

"They raised the charges. The institution still lives, with about sixty students, now consisting of the sons of the rich. The charges now are £90, \$450. The farm appeared to be under a good state of cultivation. All the labor is hired, the regular farm wages being seven shillings a week, the laborers finding themselves. That is twenty eight cents a day."

These last statements tell the whole story. Compare the young gentlemen, who are the students of this college, and pay \$150 a year for their board and education, with the peasant laborers on the college farm, who are paid twenty-eight cents a day!

The object of adducing these examples in this discussion is, to show how inapplicable are any supposed analogies drawn from the European institutions, to the questions now before the American people, relating to "industrial colleges." And by so much the more, as we see and feel, clearly, the degradations of low caste in European society, shall we apprehend, the more distinctly, the peculiar and original problem now under discussion among ourselves, where we have no permanent class distinctions at all, and where, in respect to the temporary diversities of fortune and pursuit, the very precise object before us is, not—to educate the gentlemen classes, but—the "industrial classes."

Before renewing the discussion of the argument used by the writer in the *New York Nation*—that it may not be well for us to have separate agricultural schools, because, as he says, in Germany, such schools are now in less favor than heretofore, and it is thought better to have professorships of agriculture adjoined to their classical universities—it is proper to say, that no such ques-

tion as that of purely agricultural schools, is presented to the American public by the act of Congress of 1862. That act does not contemplate nor provide for institutions designed to teach only the sciences of agriculture, and the art of farming. It embraces a great deal more. True it is, that on account of the great prominence of agriculture in our American life, and, especially because enlightened farmers and persons attached to the agricultural interest, have taken a more notable hold of this matter than anybody else, it is usual to think of these new institutions, chiefly in their connection with agriculture; and, in common parlance, and for a convenient appellation, we speak of the "agricultural college" of Maine, or of Massachusetts, when we refer to the institutions founded under the act of Congress. But this name is only partly correct, and the writer in the *Nation* is entirely in error, when he seeks to draw from the alleged case of Hohenheim—a strictly agricultural school—an argument for merging our "*industrial colleges*" in the existing universities and literary colleges of this country.

To resume the discussion of the great problems which lie underneath all this comparison of the classical university and the proper industrial college,—namely—for what sort of populations, are these different means of training properly designed? *Who* are to be educated in the industrial college, and *how* are they to be educated, and with *what ends* in view?—the examples of the argument must be drawn, in *our* case, from the actual ranks of the actual persons, who compose the industrial, or hand-working class of our own communities, and who necessarily compose the immense majority of every State, in the northern parts of our country.

For the strong lesson of absolute contrast, we have instanced the European peasant, for whom there is no future, except the simple continuance of his peasant life to the end of his days, and who is not only himself ignorant that he needs any better culture, but who is surrounded by those who are equally ignorant, or wickedly indifferent, as to any improvement of his lot. We have instanced the negro field-laborer of the South, for whom, though a great light has dawned upon him, it is still a matter of struggle, what his future is to be, and a matter of doubt, how long that struggle may last.

But nobler and more hopeful specimens of young manhood engage our attention in the Northern States, and especially in New

England. Here, in the State of Maine alone, we have more than forty thousand young men who are the sons of farmers (in the American sense,) who are the sons of mechanics—who are devoted, of whatever parentage, to the labor of a seaman's life—including also the sons of our numerous class of small traders, and including also a large number of day-laborers, not attached to any particular art or trade.

These are the young men of *our* industrial classes—these are the persons, whom the act of Congress designs to aid in obtaining a “liberal and practical education.” Of these young men, from sixteen to twenty years of age, or thereabouts, who are now working daily with their hands, it becomes us to think, when we are studying the form, and plans, and objects, of the “industrial college.” They are of divers pursuits, and therefore we are not to have a college for one object alone. They are not all to be farmers, and therefore we do not want a purely agricultural school, like Hohenheim or Cirencester; they are not all to be mechanics, and therefore we do not want instruction merely in mechanical science and art. But we want for them all, “*practical*” education, because the vast majority of them are to be practical men, and we want for them all, as “*liberal*” an education as we can reasonably give them, so as to develop their best powers, and give them as many means of usefulness, and as many sources of happiness, as we possibly can.

Look at the real case—at the positive actualities in the life and condition of these young men, as they live to-day, and as their future lives will be. The great majority of them now live in homes of actual labor. They are the sons of working men. They were bred to work, they are content to be working men, they expect to continue to be hand-workers, during at least the early part of their manhood, until, by prosperous industry, they can come to be directors of other men's labor, or until their sons shall take their work from their hands. But every one of these young men has a future—every one of them (not involved in indolence or vice) has hopeful and just aspirations to improve his condition—every one of them has an assurance, that friendly hands, on every side, will help him, if he tries to help himself, and that his efforts and his merits will be recognized by every sensible man and woman of whatever pursuit, in all the community, in every part of the State.

In our communities, from the necessity of the case, as well as under the active and generous force of our institutions, it is from

the ranks of precisely these young men, that we are to draw for almost every kind of public service, and to fill an indefinite variety of useful and honorable stations. They are hand-workers now, and most of them will continue to be so, for various periods in their future. But, in a very few years, they will also be town officers—selectmen, town treasurers, highway surveyors—they will be jurors and sheriffs and county commissioners—they will be representatives and senators—such men compose a majority of the Legislature every year, continually—some of them (by doubtful good fortune) will go to Congress. If we cannot, in the State of Maine, say that any such man, while still belonging to the industrial classes, has been made Governor of the State, yet certainly, most honorable examples of the kind have occurred elsewhere in New England. And even though they may go into no public station whatever, yet in their middle and maturer life, they will be the controlling strength and influence in every inland town. In the career of a strictly private life, every one of them has a right to expect—great numbers of them *do* expect—to attain to conditions of independent comfort and happiness. European peasants, and Southern negroes, scarcely know what is meant by a home, in its rudest form. But the son of the New England working-man, taking for his own lot, also, the life of a working-man, expects to be a “forehanded” owner, in fee, of house and land. He expects to have a wife, who will be proud of him, he expects to have sons and daughters, who will be the ornaments of his home, in his active days, and who will be his strength in his declining years.

We should not forget, because it is among the most important of the future services, to which these young men will be called, that they will always compose a large majority of the four or five thousand schoolmasters, annually employed in this State. So also, out of the number of them who are seamen in early life, we shall make—we shall be obliged to make—our shipmasters, the captains of our important coasting navigation, and the commanders of our ships in foreign trade.

Between these young men, who have such a future, and such opportunities, still belonging to the industrial classes, and that other portion of our young men, who are expecting to embark in what are called the learned professions, there needs now to be made only this comparison—that the latter are, at any given time, only a very few hundred in number—the former are more than forty thousand at all times, even after allowing for that very con-

siderable proportion, who are designing to engage in the business of merchandise.

The working young men of New England, have always had better means of education, than any similar class in the world. Their facilities for mental improvement are good, to-day. The common schools and the academies have wrought most excellent results. The simple question is, how to give them a mental training still better, more varied and more complete, so as to open for them a wider and higher usefulness, and give them the command of richer sources of happiness? and—how to do it in the most effective way? and—to touch the matter in its very sharpest point—*how to do it, so that, though educated much more completely than they now are, they shall still continue to be hand-working men—still continue to belong to the “industrial classes?”*

For, in these high northern latitudes, unless a very large majority of our people are actual hand-workers, we cannot live here. If we should educate all our young men and young women, in such manner and after such notions, that they should, thenceforth, cease to be hand workers, and think to get a genteel living by their educated wits, our entire population would be obliged to migrate into some climate, which permits a softer life, and abandon these fields and valleys, to be covered once more with forest, and occupied again by the more sensible beavers and Indians and red deer. Was *that* the design of the Providence which planted us here?

In this way of putting the case, I am touching upon a course of facts, now current and patent, before the eyes of us all. Very considerable numbers of young men and young women, obtaining here, in this State, the best education open to them, and then assuming, alas! that *because* they are educated, they are *therefore* no longer to be hand-workers, and, finding but few and scanty chances of gaining their bread by merely intellectual pursuits, in this State, are migrating annually, and seeming to themselves to be obliged to migrate to other States, for employments suited to their educated capacities. And at the same time, some wise men among us are talking, or were recently, of importing Norwegians into Maine to increase our working population!

We have come to a point in the discussion, where we stand and behold, unmistakably, the great line of distinction, that separates the ordinary literary college and university, from the proper “industrial college” contemplated by the act of Congress. The ex-

isting colleges, of the ordinary type, were never designed nor expected to educate laboring young men *as such, and with a view that they should continue to be such*, after obtaining their education. They take a great proportion of their students from pursuits of hand-labor, but, in every instance, with scarcely a possible exception to be found or heard of, they educate them *out* of their labor, fully and utterly, and with express intent so to do. Great numbers of young men have gone to the colleges from the families of farmers, and from the families of mechanics, but not one in a hundred ever went back to the farm—not one in ten thousand ever went back to the mechanic's shop. From the very nature of the case, it must be so. The whole idea of the common university and college is, and has been for hundreds of years, in Europe and America, to educate young men with a view to life in the learned professions, so called.

The sum of the matter is this—in two parts :

1. In European communities, and wherever distinctions of caste are permanently fixed, there is not, and never will be, any thorough, public provision to give superior education to the young men of the laboring classes. Scientific chairs and agricultural professorships may be established at Halle and Leipzig, at Cambridge and Oxford, in whatever number, and with whatever profusion of endowment, but they will draw no peasant from the field, no artizan from his bench.

2. In the American States, we have a thousand colleges and universities, (as we call them) and, in accordance with the genius of our institutions, and the supposed demands of a new country, they educate great numbers of young men, who come from the ranks of actual laboring life. But of all these colleges, not one has ever made provision, so to educate a laboring man, that he will, by design and of choice, continue to be a laborer ; not one of them sends out a graduate, with the purpose to be an educated man and a hand-laboring man, at the same time. Nor is there any probability that the existing colleges will ever try to do this.

Is it impossible ? Is it inconceivable, that, in a college of a different stamp and aim, there can be a place of discipline and training, by which American young men shall be led to choose and love a life of labor, and, at the same time, be fitted to attain to that higher usefulness and happiness, which come from superior mental culture ?

That is the problem before us at this hour—a problem forced

upon us, I submit, by every fair interpretation of the act of 1862, and one, which, here in the State of Maine, with our 45,000 working young men, we ought not to leave untried any longer.

March 8, 1866.

SCIENTIFIC SCHOOLS.

Having, in two preceding papers, attempted to show what, I think, is a wide and unavoidable diversity, between the methods of public education, which are resorted to, in those communities where deep and permanent distinctions of caste exclude the actual working classes from all benefit of superior mental culture, and the methods, which *ought* to be adopted, in those of our American States, where the "industrial classes" compose the immense majority of the population, and not only hold so much power and influence, but have within their reach, so many resources of comfort and happiness, if they are taught to know their good fortune—I place, at the head of this paper, not the title "Agricultural Schools," which I found, inaptly and erroneously employed, in the article from the *New York Nation*, but the title "Scientific Schools"—for the purpose, if you will permit me to occupy your columns a little further, of showing how, and to what extent (within certain limits) the public opinion has been led away from a just observation of the distinctions I have pointed out, and how a mischievous delusion has obscured the aim of many good men, who really desired that the "industrial classes," might have the best benefits of education.

What are called in this country, and particularly in New England, "scientific schools" are, in fact, a compromise between the forms of education for the so-called learned professions, and the demand of the times for the education of practical men, for practical life. This compromise, like most others, has been somewhat at the expense of principle, and though it has effected some very good results, it has caused a great mass of notorious facts to be wholly ignored, and many great duties of the governing power, in the Free States, to be wholly neglected.

The history of this compromise is curious and instructive. For a time almost beyond history—for hundreds of years at least—universities and colleges, in Europe and America, were devoted, as repeated so many times, to the education of young men for the

learned professions—either to their general preparatory culture, or to their special training in the attached, professional schools of law, divinity and medicine, or to both. For a long, long time, the world was satisfied with this, and thought it all right and all sufficient. Within a half century past, the great and rapid advancement of the material sciences and the useful arts, particularly in this country, created a demand for a body, or class of men, who should have such training in early life, that they could carry forward those sciences and arts, to the highly important and valuable results, called for by the peculiar civilization of the age, and by the new necessities of practical life. This demand was pressed, in various forms, by practical men, upon the colleges and universities. They were the seats of learning; they were in possession of the apparatus of education; they had the public endowments; they professed to be taking care of this great public interest. It was insisted that they should do something more than they had been accustomed to, and that they should enlarge, or modify in some way, their courses of instruction, so that young men, who desired to become engineers, and architects, and naturalists, and geologists, and mining overseers, and chemists, or to devote themselves, under whatever appellation, to the higher uses of the improved practical life of the time, could obtain, within their walls and classes, the necessary general and special culture, as well as the future ministers, and lawyers, and physicians.

To my knowledge, and within my recollection, no one of the ordinary colleges in this country, ever responded to this demand, in manner and form, as made. True it is, the colleges were not insensible to the scientific progress of the times. They taught more science, and better science, and more of the principles of the practical arts, than they had done before. But only, as a part of the same continued curriculum, which embraced the training of the embryo lawyers and divines. No pressure of practical science, induced them to give up their elaborate routine of dead languages, or whatever other studies had usually been thought needful, for a career in the *learned* professions. No college, distinctively and designedly, introduced *into* its calendar, a course of study for the express purpose of preparing young men for such walks of practical life as are above stated. Precisely now, as forty years ago, the great majority of young men, who spend four years in college, are expected to be ministers, lawyers or physicians. The courses

were made for them, and are adhered to for them. *That* is the regular college course.

Within a few weeks, I have seen a newspaper advertisement of Tufts College in Massachusetts,—not now at hand—where it is stated that certain courses of study, for practical life, as distinguished from the learned professions, are introduced into the regular college course, and form an integral part of the proper college routine. I know of no other such case.* Very imperfect attempts were made some years ago, in a few colleges, to make some provision of the kind, *outside* of the regular courses, and the pupils that came into these arrangements—few enough, to be sure—were called *partial* students, or students in the *partial* course!

The public demand I have mentioned, was met in another way. The earliest response to it, that I remember, and a most laudable one, too, was the school for practical education in science and useful arts, founded by the noble-minded Stephen Van Rensselaer, about forty years ago, at Troy, New York, and long and well known by the energy and skill of its first instructor, Professor Amos Eaton. It flourishes to this day, as one of the best scientific schools in America.

One such school, of course, was not enough. Not many years later, Abbott Lawrence made his liberal donation for founding the "Scientific School" at Cambridge, which bears his name, and which has been, very nearly, the model for several others since established. But at Cambridge, at Yale College, and at Dartmouth College, these new undertakings are not brought *inside* of the regular college course, as integral parts—they remain on the *outside*, as adjunct schools, nominally attached to the colleges, which, of and by themselves, are hedged round with Latin and Greek, as of old.

This is only another way of stating the fact, obvious enough also in the nature of the case, that these establishments for training young men in practical sciences and arts, are merely profes-

* Shortly after writing these sentences, I was applied to by a young friend, whose contemplated college education had been interrupted by three or four years' service in the army, to advise him as to a place, where he might still obtain a superior general education, for practical life, without Greek and Latin or the higher mathematics, for which he now had not time. I mentioned to him the college above named, but, on obtaining a catalogue, had the regret to find, that, although a tolerably satisfactory programme was there laid down, for such general and practical education, yet the Faculty had distinctly inserted, along with it, their recommendation, that young men should not adopt that course, but rather, the full classical curriculum of dead languages and mathematics!

sional schools, adjoined to the college or university, just as, in some cases, the schools of law and divinity and medicine are. Harvard College and Yale College have them all.

The result is simply this: that we now have an enlarged variety of educated professions. Formerly we had but three—called the *learned*—now, by means of the scientific schools, we have the *scientific* professions; we have professional engineers, professional architects, professional chemists, professional geologists, professional mining engineers, &c., &c. All this is a very great and fruitful advance beyond that former barrenness, where, even in these free and intelligent States, it was not thought necessary for anybody to be an “*educated*” man, except the lawyer, the minister, and the doctor. The difference is very great. Its effect upon the aspirations of many ingenuous young men is most excellent. It has opened most honorable and useful careers to very considerable numbers of them, who had not the time or the taste to go through the courses of dead languages and other such discipline, by which only, in former times, a professional position could be gained.

It is now a very respectable thing for a college to have a “*Scientific School*” attached to it. It is thought to add to the dignity of the central institution; it gratifies the governing and managing aspirations of trustees and overseers, and is supposed to increase the importance of presidents and professors, besides adding to the patronage and custom of people who live in college towns. Hence arose, undoubtedly, that very eager, and by some thought not altogether generous rush, that was made, throughout New England, to seize the endowments granted by Congress in 1862, for the education of the “*industrial classes*.” On the showing of their hands, it was evident that these claimants had made up their minds, that the “*scientific school*,” after such models as the Lawrence, with a little agricultural chemistry and veterinary surgery superadded, would answer all the purposes of the act of Congress; and such schools, they would be most happy to “*annex*” to their respective colleges, “*provided that*” (as members of Congress say) they could also be allowed to *annex* the Congressional endowment to their college treasuries. In some cases, these claims have been consented to—in others, they have been resisted. Results are in the future.

Now it is a simple question of the interpretation of a plain statute law, whether a scientific school, such as those we have, attached

to some New England colleges, designed for the training of a very limited number of young men to be professional engineers, architects, chemists, geologists, naturalists and miners, meets that clause, which requires the endowment to be applied "in order to promote the liberal and practical education of *the industrial classes?*"

Towards an answer to this question, two or three observations may be made :

1. Congress does not undertake to provide for the education of persons, to oversee and manage, certain departments of business, in which the "industrial classes" are interested, such as road-making, and the construction of edifices, and the manufacturing of chemicals, and the working of factories and boring for oil, but it provides, explicitly, for the education of the "industrial classes" themselves.

2. It is perfectly obvious, that, here, in the State of Maine, for instance, if we should turn out from a scientific school, in a year, half a dozen professional engineers, and three or four professional architects, and two or three professional chemists, we should simply glut the market. We have not employment for half that number. They would have to starve or migrate. But the young men of this State, who belong to the "industrial classes," and who are of college age, are more than forty thousand in number.

3. Nor is this observation met by saying, that our "scientific school" would educate certain of our young men for scientific professions, who could then, in default of employment here, remove to the Western or Southern States, and find positions there, because, in the first place, we need our educated young men *here*; and secondly, because Congress has granted this endowment to every State, and therefore, there is not the opening for our young men, that the case supposes

4. Since the greatest of all industries, in Maine, is agriculture, it is a fact to be observed, that the general model of the "scientific school" as heretofore established, makes little or no provision for any instruction, which will be serviceable in practical agriculture. Yale College is inaugurating an attempted exception, which will be noticed below. I should say, it is well understood, throughout the community, that these schools are not usually designed for the education of farmers. The catalogue of the Lawrence School always places against the name of every pupil, the branch, which he is pursuing. But, in a series of years, not a name can be found,

against which appears any indication that the student ever had, or intended to have, anything to do with farming. The Rensselaer School publishes, with its annual catalogue, a list of all its graduates, showing, as far as practicable, what are, or were, their pursuits in life. Of course, there is no account of the number, who left the school without graduating. But of the actual graduates, 367 in number, I find that only sixteen are designated as "agriculturists," and these are all in the earlier years of the school—for the last eighteen or twenty years, not one. The graduates are engineers, architects, superintendents of public works, and such professions.

5. The comprehensive observation of all—as partly indicated already—is, that the common scientific school, like the common college, though it may, like the college, draw many of its students from the ranks of laboring life, returns few or none to those ranks. If it educates the young man who was a hand-worker, it educates him *out of* his labor—it does not usually so educate him that he will go back and belong to the "industrial classes." It makes of him a professional man—an honorable and a useful one, it may be—but by the very act of his education, in *that* form, he ceases to be one of the class, which the congressional endowment was designed to benefit and improve, as a class by themselves.

I cannot believe, therefore, that the "scientific school" as now in fact known in New England, answers the requisitions of the act of Congress; and although it is an admirable compromise between the old college forms and the new scientific and practical demands of this century, yet it is not a compromise, which reaches to the accomplishment of the end prescribed in the act—the liberal and practical education of the industrial classes.

To bring forward here such a matter as details of *expense*, in procuring an education, would not, of itself, control the interpretation of the statute, nor modify the essential reasons of the subject in hand. But it is well known, that the question of obtaining or not obtaining a superior education, is very often controlled and decided by the question of what it will cost. From the nature of the case, it is evident that, as a general rule, the cost of training in a scientific school, attached to a college, will be just about the same, as in the other professional schools, and just about the same, year by year, as in the college proper. It is the last, which makes the standard on the whole. Many of the college students are the sons of men of means. To a certain extent, they control the style

of living and the scale of expenditure. There are few facilities in any of the colleges, and fewer in the professional schools, for self-subsistence. College towns are apt to be expensive places, and notwithstanding their public endowments, the colleges and professional schools expect to derive an income from their students. I have before me the year's bills of a young man, who was a pupil in the scientific school at Cambridge. The amount, embracing only the established catalogue charges, and board, omitting all extras and merely personal expenses, was over five hundred and thirty dollars for the year. In some other places, it would not cost so much, but, whatever the amount, it is, as we say, *all cash*, and is a burden, which only a very few of *our* young men can bear.

To the scientific school of Yale College, there was added last year a "Course of Agriculture"—two courses in fact, a full course and a shorter course. The full course is three years, and the charges, in the school bills alone, are stated to be about one hundred and seventy-five dollars a year. Add the cost of board, in a town like New Haven, and the result is an expense, such as could be borne only by a few of our young men. The shorter course differs from this, as to cost only, in leaving out one term in each year.

The experiment at Yale College is an interesting one, and, if good results can be obtained anywhere in this country, by attaching a course of agricultural instruction to an attached scientific school, in a college town, without a farm, and without practical discipline in the field, they may be expected to be reached there. But however successful the experiment may be, with the few students, with whom it is possible to bear such expenditure, the question will still remain, demanding its answer, What is to be done for the thirty or forty thousand young men in Maine who stay at home, and who must stay there, until methods of education are provided, suited to their present and expected condition in life, and within their means to obtain?

March 19th, 1866.

AGRICULTURAL SCHOOLS—No. 4.

The College for the Industrial Classes—What should be Taught?

If then, the attempt ought to be made, to offer to the young men of our large and constant class of hand-workers, such man-

ner of education, as that, while abiding, through their early manhood, in the ranks and pursuits of actual labor, they shall also command, for their life time, the happiness and the usefulness of superior mental culture, it is impossible not to see that we meet here, unavoidably, the next great question in the case,—What course of study and discipline is most likely to answer their specific necessities? This question, it is plain, lies at the very foundation of the matter, side by side with that first problem—*Who are to be taught?*

No one ought to attempt a complete answer to this question, until after some honest and wise experience has been gained in this now untried field of effort. And I hold, without hesitation, that the best persons to devise the particular plans of study and discipline for such pupils, in such a college, are the very persons, who are to work out and execute the actual details of the daily life of the institution. If the managing overseers of such a college, at the very outset, after determining to aim at some such object as I have brought to view, were then asking for some one to help them, about plans and subjects of study, and methods of internal policy and discipline, I know not what better advice could be given, than simply this: First of all, find the men who are to administer the internal life of the college,—make sure that they are the right men, sound and clear upon the essential principles of the business in hand—men, who heartily desire, and fully believe in, the personal union of skilful head-work, and skilful hand-work, and let *them* devise the courses of study and discipline, which they themselves are to carry out. So I trust, there would be less danger of slipping into the ruts of old routine, and the pernicious facility of doing as other people do.

Waiving, therefore, all pretension of laying down any scheme of particular studies—some of the departments, also, being quite beyond any province of mine to advise about—I venture, nevertheless, upon a few general suggestions, as to some parts of the educating influences and means of influence, which I hope such a college may exert upon our working young men of New England—attempting, at the same time, to show how plainly and distinctly the act of Congress sustains the views I have advanced.

1. We must bear in mind the element of *time*, as affecting and controlling to some extent, the study and the life of the college. The seven or eight years required for such education as is obtained by the graduates of the other colleges, is wholly out of the ques-

tion here. The young men could not submit to it, and there is no reason in the world why they should.

2. Since the Industrial Colleges are founded upon a public endowment, faithful recurrence is necessary to the specific terms employed in the act of Congress, so that we may observe both the range and the limits of the training contemplated. Congress has not established merely "agricultural schools," and nothing more, nor more schools for instruction in principles of mechanic arts. Reflecting persons ought to be on their guard against settling down into the habit of calling the institution "the Agricultural College," lest, by the mere force of a name, they should come to think that it is designed only for farmers, and will teach nothing but agricultural science and art.

It will be seen, also, that in the corps of instructors and directors, there are to be other faculties besides those of teaching agriculture and mechanics. General education is specifically provided for, as well as training in the rules and methods of practical working life.

3. The act of Congress is very plain. It declares that in the college thus endowed "the leading object shall be * * * * to teach such branches of learning as are related to agriculture and the mechanic arts." Evidently, therefore, students who are intending to engage in mechanical pursuits, must be provided for in the course of theoretical study, as completely as those who are to be farmers, although, from the nature of the case, there cannot be an equally full opportunity for practical demonstrations and applications of what is taught. Conceding then, as we must, that the future mechanics and the future farmers are alike within the provisions of the act, I now recur to one of the clauses omitted in the above extract, which, although it is negative in form, I understand to be full of affirmative meaning and direction. The clause is—"without excluding other scientific and classical studies." It is hardly necessary to remark here, that the term "classical" is not to be taken in the narrow sense, that would confine it to the study of Greek and Latin. It is plainly a broader term, as here used. Precisely as the adjoining word "scientific," may include natural science, or metaphysical, or political, or ethical, or some other kinds, and it is left to the judgment of those in charge to determine which, and how much, of these scientific studies may be undertaken, so, out of all that other group of literary studies, which pertain to what has commonly been called a classical educa-

tion,—in which our mother English is most surely entitled to a place—it is provided that those, who plan and administer the courses of study, may select and teach such parts as they find practicable and servicable for their pupils. All this I take to be equivalent to an affirmative declaration by the act, that, while the leading object is to train young men to be farmers and mechanics, they are also to receive as good a general education, and as comprehensive a culture as is reasonably practicable, within the means at command, and the time, which these classes of young men can devote to early, formal education. Thus it will result, that the young man, who has gone well through these courses, will not only be able to say to himself, with just and honorable satisfaction, “I am now well trained to be a farmer;” or, “I am now educated to be a mechanic,” but also, and in both cases, “*I am now an educated man,*” and not only say so, but prove it, by his life.

This view of the problem before us, cannot be too carefully and deeply considered. We shall belittle and enfeeble the whole enterprise, if we suffer it to settle down into mere specialities of farming and mechanics. There is no need of it, at all. If the students are wisely directed, they can gain most excellent proficiency in the elemental principles of those pursuits, and in much of the practice, and, at the same time, can acquire a good general education—one that will put them, intellectually, on an equal footing, at least, with the majority of our professional men, and one which, dignified, as it may be, by the manifestation of thorough skill in practical arts, and by the energy of a useful practical life, will secure to them respectful appreciation by the most cultivated persons in society.

And I cannot doubt that the act of Congress intended to indicate just such a result, in its declaration, that such and such things are prescribed, “*in order to promote the liberal and practical education of the industrial classes.*” The term “*liberal*” appears to be employed, as if with design, to show that general culture, intellectual development, and some degree of literary refinement, are to be aimed at, as well as proficiency in useful arts of hand-labor.

4. Having spoken so distinctively in the preceding paragraphs, of farmers and mechanics, I wish not to be understood as leaving out of view that very large class of young men in Maine, who are more or less devoted to a seafaring life. Sailors are not usually

called mechanics, but it is evident, that much of their art rests upon those mathematical truths, which are the foundation of so great a part of mechanical teaching, and that, in plying their trade, they are constantly dealing with machines, which involve scientific principles, and which they will use in the best manner, when they are trained to the best understanding of them. For them, therefore, the college will furnish a large part of the elemental training so necessary for their highest usefulness, and for their best personal improvement. Of course, I am not now referring to that class of seamen, gathered out of the seaports of all the world, whose only life is from the boarding-house to the ship, and from the ship, back again—from whom nothing is expected but manual dexterity and unthinking obedience—the “old salts,” whose career, begun by accident or necessity, is pursued without aspiration, and without hope or thought of self-improvement or independence. But I am referring to the native-born, young sailors of Maine, whose actual homes are here, on all our hundreds of bays and rivers, so many of whom enter upon that career, with definite purpose and expectation to improve their condition—great numbers of them becoming, as we know, commanders of vessels—and for whom a sensible, skillful, and systematic education in early life, with the influences of a New England home to help, will tend to make them, when they reach the quarter deck, not only thorough seamen, but also well educated men. And such an opportunity for their early training seems to be the more desirable, because so many of the sailors of Maine lead a double life. It is very common for them to be both farmers and sailors, and the college will open to them means of improvement in both capacities.

5. I cannot form, and have never attempted to form, any idea of the institution, which does not include, in a large and controlling degree, the essential feature of a common *home* for all its inmates—teachers or directors and students—where the sympathies and intimacies will be far closer than they are in the ordinary college or university. If I supposed that teachers and students were to live altogether apart, save only as called together, twice or thrice a day, by tap of bell, for formal recitations, I should abandon all hope of any results worthy of the labor and cost of the enterprise. But since the design seems to be, to make the training of the college bear directly upon actual life, and since the handling of practical subjects, by practical demonstrations, is to form so large a part of the discipline, and the students, coming from homes of actual labor,

are to be trained and educated as and for laboring men—and so ought not to intermit labor altogether, while in their training—and are to go from the college, into a life of just such labor as has formed a part of their education, it seems probable that teachers and students will be brought into near and frequent intimacies.

And I suppose it scarcely possible, in this age of the world, that any instructor in such a practical college, will fail to see the indispensableness of teaching by the observation of facts and things, as well as by the theories and statements of books. The laws of nature will be shown by the facts of nature, and by natural objects. Students must be taught about these things, in the open world of nature. Teachers and students together, must see and handle the actual things, which are the subjects of instruction—plants, and rocks, and soils, and fruits, and crops, and machines and apparatus, and horses and cattle. In a word, the life of the college, and the instruction of the college, will be, to a large extent, one and the same thing.

I should count it, therefore, as one of the most beneficent and fruitful influences of the college, that these young men, with but limited opportunities, before, for intellectual culture, would be brought into so direct and constant intimacy with the cultivated men, who compose the corps of instructors. From these men, as models of learning and manners, so often and familiarly with them and among them, they will receive refining and liberalizing influences, quite beyond the effect of the formal hearing of lessons in the class room. It is impossible to over-estimate the value of *learning by models*, where these models are high-minded, sensible, well-behaved, cultivated men,—sympathizing, affable, generous and kind.

6. I should hope that, foremost among the means employed in the colleges, to wake up the minds of the working young men, would be a large and good library. I do not refer now to the apparatus of scientific books; I mean a library of all kinds of good books, in their mother tongue, which would amuse, entertain, enlighten and instruct these students, by the knowledge of a thousand things, not before open to them, serving to excite their curiosity, and to create an appetite for intellectual improvement. Many a young man would wake up in such a library, who was never intellectually awake before, and, once aroused, his mind would never go to sleep again. Experience would show too, most interesting examples of young persons, who, though they never saw but few

books before, had, in reality, a keen zest for the delight of reading, and whose introduction to such a library, would open to them a world of wonder and pleasure. Such a library should be so large and so good, that the students should see and feel it to be a most prominent and important part of the institution. And I know of no better way of placing and using such a library, in such a college, than simply this—to put it in the most central and conveniently accessible part of the whole establishment, with its doors never locked, and with the fullest liberty and encouragement to every student, to resort to it, at any hour of day or evening, when free from prescribed duties elsewhere, and read at his pleasure, only under such advice as a judicious superior would give, in the way of helping and not of hindering, and—subject to such advice—absolutely without any other restriction, than that his hands should be clean. If, in resorting to and enjoying such a library, the student should, there, also frequently meet his instructors, engaged like himself, in making intellectual research, or seeking intellectual entertainment, this would be another sympathy of their common life, and would draw the pupil into still nearer, pleasant and courteous intimacy with his cultivated superiors.

7. As an attainment specially desirable for these young men, I should reckon a thorough training in the knowledge and use of their mother tongue, and a liberal acquaintance with the lessons of truth and wisdom contained in its literature. Other languages may, perhaps, also be taught, for the sake of scientific enlightenment, but as a resource of general culture, and as an instrument of an educated man's power, a good mastery of the English language, would be, to all these young men, a discipline of primary importance. I do not refer to the mere technicalities of linguistic study. I should hope the persons in charge would not yield to the detestable and accursed superstition of teaching the grammatical science of a language, instead of teaching the language itself. To our young men, already trained by school and home influence, to a comparatively accurate use of their native language, it may well be further taught by its models, rather than by its rules. These models, skilfully and abundantly placed before them, not only in books of classical English, but in the refined speech and style of their instructors, to whom they listen, and with whom they converse in the daily and hourly intimacies of their common life, will unavoidably tend to form, in them also, the habit of speaking and writing, in their mother tongue, with accuracy, readiness and force.

Direct instruction, of course, will not be omitted, but that may well be, upon the actual and practical use of the language itself, and not, mere drill upon its forms.

How important it is, that our working young men should be trained to this faculty of speaking well and writing well, in their own language, cannot fail to be observed, when we see how often, in common life, and how unfortunately, this distinction has to be drawn, between our practical men, and those who are called the educated men of the community—that one class has the command of language, the other has not. The practical men are not, unfrequently, the complete equals of the other class, in good sense, in the understanding of the subject matter, and in devotion to the object in hand,—often, are really superior in these particulars—but they are compelled to be silent, while an unjust, and sometimes unprofitable prominence has to be given to the few, who have been educated to the faculty of speaking or writing, on public occasions. In a thousand instances of constant occurrence, the practical men, the working men, are obliged to ask of the educated men—the lawyers, the ministers, or some other such person—to prepare for them written statements, reports, and documents, or to make addresses and speeches, because, as a result of our usual method of education, these latter commonly have, or are supposed to have, a superior faculty for such purposes. This inferior and subservient position of the practical men is wholly needless, if only, they can have that “liberal and practical education,” which the act of Congress intends to give to the “industrial classes.” Of course, to speak well, or to write well, one must also have the faculty of thinking sensibly and reasoning justly—and this faculty, no intelligent educator of our working young men, will fail to train and develope—but it is just as certain, that a diligent, well-disposed and ambitious student of an industrial college, can be taught to speak well and write well in his mother tongue, as it is that he can be taught to swim or to skate. Not that our young men should be trained into a foolish and vain habit of making speeches for pride and show. I only urge that they should be so educated, that they will be able to speak or write, with acceptance and conviction, whenever a just duty to themselves or others may reasonably require it.

8. In my citation of the terms of the Act, I omitted the clause, “including military tactics.” This is affirmative and directory, and indicates that Congress thought such instruction to be not

only desirable and important, but practicable also. Undoubtedly, by a careful distribution and economy of time, the students can be made familiar with the manual of arms, and the evolutions of small bodies of men. If suitable instructors are to be obtained, they can also be taught a good deal of the general principles of the military art, and of the history of warfare, especially as illustrating the history of their own country, and as inculcating, withal, the greatest lesson of war, a true love of peace. But without attempting here to go into any particulars of this part of the instruction, I submit, that under this provision of the Act, a most excellent general influence might be exerted, over and through the whole institution, by the enforcement of habits of order, and habits of obedience to regulated authority. Not, by any means, that all the discipline should be of military strictness, but that, throughout the whole life of the college, and affecting all its members, officers as well as students, it should be as well settled, as in the "tactics" of a camp or a garrison, that there is to be no disorder, no confusion, no recklessness, and no permitted disregard of reasonable regulations. To teach a young man the manual of arms, and yet allow him to be a sloven in his personal habits, to require him to observe the word of military command, and yet be contemptuous of all other lawful authority, would be simply nonsense, and the most unthinking student would feel it to be so. A proper observance, therefore, of this clause of the Act, would tend to make the young men orderly, neat, and justly deferential to wholesome rules of personal conduct. How important these habits would be to them in after life, in plying their vocations, in managing their property, and in training their children, needs no argument.

And not least important, I should suppose, among the effects of this clause of the Act, upon the whole internal policy of the institution, would be the observance of that indispensable part of military arrangement, *frequent and rigorous* INSPECTION. Not mere espionage of the students—not mere examination of their dress or their arms, when drawn up in line—but comprehensive, systematic, regular and peremptory inspection of every body and every thing belonging to the institution—from the highest officer and the most prominent service, down to the lower details of the farm and the workshop. By such means, all would cultivate an eye for order, and a sense of propriety and fitness. And one great object of such inspection is, to reach the conduct and conscience of superiors as well as of subordinates. The highest must bear inspec-

tion as well as the humblest, and where this discipline is faithfully applied, it sometimes happens, that, although a subordinate may be immediately and actually in fault, yet it is the superior, who is justly cashiered, for allowing indifference and neglect of regulations.

This method of management is not common in colleges, any more than it is on railroads. But there are few departments of human affairs, where it would work better.

There is but one thing in the Act of Congress, which I regret—and that is, that the Act employs the term “*college*” to designate the institution contemplated. The danger is, that the *name* will suggest and encourage pernicious imitation of old and inapplicable forms, and methods, and habits. One of the hardest things to be done, in the course and management of human affairs, is to *keep the wheels out of old ruts*.

April 23, 1866.

THE INDUSTRIAL COLLEGE—No. 5.

Questions of Cost.

The question of the cost of educating the young men of the “industrial classes,” is one, which lies as near the foundation of the subject as any other, and is, if possible, more indispensable to be met, than all others.

To attempt to manage this question by the mere dullness of imitation, and leave these young men to pay their bills, as young men do in other colleges, is a simple dodging of the whole case, and will be fatal to any of the colleges, that shall slip into that rut.

A cash expenditure, to pay college bills and board, of from three or four hundred to six or eight hundred dollars a year, is a simple impossibility, when the question concerns the mass of working young men, in this part of the world.

The whole question is in two parts—the cost and character of the public structures, fixtures and apparatus of the institution, and the private expenditure to be borne by the individual student. By unfortunate arrangements about the first branch of expenditure, the second may be deeply affected. Pretentious buildings may give pretentiousness to the whole establishment and to all its life, and may force out of practice, and out of view, that pure simplicity, which is the warp and woof of all true economy. How far

and how wisely the dangers of this part of the question will be avoided, in these new establishments, a few years' time will disclose. All experience shows how great is the chance of mistakes under this head. The managing authorities of such public institutions are regularly victimized, in a great many cases—sometimes by themselves, through the obsequiousness of doing as other people do, or the ambition to make a special show of their own—sometimes by the partisanship of local dignitaries, who wish for buildings that will glorify the neighborhood—sometimes (and that too often) by architects, who wish rather to display themselves, than to do the true duty of their art, and, not unfrequently, by actual builders, who think it not their business to be troubled about cost, if the bills are paid, somehow or other.

Restricted, as the colleges are, by the act of Congress, rigorously and wisely, from spending any part of the endowment upon buildings, if the managers of the institutions lavish the means they obtain from other sources upon ostentatious edifices, and fixtures, they will thereby, in the majority of instances, convert themselves into public beggars. And as these institutions may not, for some time to come, command the favor of the present influential classes, such beggary will be as hard, as it will be degrading.

In such a position towards the public, the institution can hardly be attractive to its expected inmates, or in a condition to impress upon its students, that form and force of independence, which, next after simplicity, is the best element of economy, and among the best influences that promote a useful and cheerful life.

To the students, the college will be a place of home-life for some of their best years; to the officers and teachers, it may be a permanent dwelling-place. And for both of them, therefore, the utmost care is required, that no architectural caprices impose upon them, a life of discomfort. He needs to be a wise and cautious man, who builds houses, in which *other* people, not criminals, are to be *forced* to live.

The strictest regard to the fitness of things—the adaptation of forms to purposes, and of means to ends, will be the best rule of architecture and the best rule of finance, for the colleges now contemplated—original and peculiar, in their character, as they are—having, as their sole design, to do what never was attempted before, in all the tide of time, on such a scale,—“to promote the liberal and practical education” of the young men, who belong to

the working classes, and, who are to continue to belong to them, after they are educated.

It is assumed, of course, that there is to be a domain of tillage, grass-land, pasturage and forest, with buildings for the crops and the domestic animals, and workshops and laboratories to some practicable extent. If any persons assume, that the students are to be housed in dormitory buildings, with separate rooms, as in the old colleges, a difficulty of the most serious nature presents itself, in the charge of such buildings upon the common funds, and the rent, which, on such a plan, would have to be exacted from the students. It might be interesting to anticipate, how, after some period of experience and prosperity, it would be practicable to afford larger accommodations, but in the first experiments, with very narrow means, it is far safer and easier, to go upon the plan of large common rooms—one or more, as the case might require—for study and for social life. This would comport with the idea of household arrangements. So also, large common chambers for lodging. Such arrangements are perfectly practicable. It is not necessary to think of the fore-castle of a ship, or the barracks of a garrison. These may be places of confusion, ill-manners and discomfort. The wards of a well-managed hospital give an example of another kind, where, by thorough regulation and discipline, the utmost order and neatness are secured. The pupils of the Girard College—some years ago, at least—all slept in large common rooms—each one, with a separate bed. The same kind of arrangement, I have been told, is strictly maintained at the Friends' Boarding School in Rhode Island. Both these institutions are affluent in resources, but they have not thought it necessary to impose upon their funds or their students, the cost of separate dormitory buildings and rooms,—which, besides their cost, have the pernicious effect of obliterating all idea of household, or domestic life.

How are the students to be subsisted?

Our own legislative act for the industrial college, contemplates that the *tuition* is to be, without charge to the student. But in all colleges, the charge for tuition is very light, compared with the cost of subsistence. This is the great difficulty and barrier, which has shut out vast numbers of young persons, of both sexes, from such institutions of learning as we now have. Oftentimes, a father, or a widowed mother would gladly have paid the twenty or thirty dollars, or twice or thrice these sums for the instruction of their children—but the moment that *home* is to be left, comes up the

question of subsistence, in another town, in another family. A cost of one hundred, two hundred, three hundred dollars a year—*all cash*—credit is impossible—this is not a difficulty,—it is an absolute bar against entrance to the places of education, for thousands and tens of thousands of every generation, here, in our own State.

Is this a necessity? Is there no ingenuity or pains-taking, that can devise a better way?

Assuming that the site of the college is to be a farm of adequate extent, of at least average fertility, reasonably divided into plough-land, meadow, pasturage, forest, and orchard ground—assuming also that the sons of “the industrial classes” can be provided, by themselves, or by their friends, with books and clothing and bedding, and with means to defray the cost of washing and the other small personal expenses—I propose, without hesitation for myself, but with due deference to all better judgments, as a solution of the problem of subsistence, that the students be trained to produce their own food, or, as much of it as may be practicable, and, if practicable, a sufficient surplus to pay for the cost of cooking it.

Such production of their own food, by the students, would, of course, include the raising of forage crops for the requisite number of domestic animals.

Be it observed, that I do not use the word “*earn*,” but the word “*produce*.” To earn a subsistence is one thing; to produce it is another. Manual labor schools of the old pattern, were places, where the pupils undertook to pay their bills, by *earning money*,—usually, by workshop labor. But that involved dependence upon markets. The student had to *sell* the product of his labor, and was therefore exposed to the chances of merchandising. Usually, he could make but a limited variety of fabrics, and these might be what the market did not want. Unable to sell his products, he was forced to omit his work, and, being idle, could not pay his bills. Sometimes it was arranged, that the institution gave the student credit for his work, and took upon itself, the sale of his wares. But that soon made a bad matter worse. As a general fact, such plans wholly failed.

But in the industrial college, with productive farm lands, there are means to solve the problem, or to *try* to solve it, in another way. If the student can produce enough wheat and Indian corn, for his own bread, and enough more to pay toll to the miller, and wages to the cook, it will be as wholesome as if raised by other

men's labor, and loaded with other men's profits, and it will be the bread of independence, which he can eat with thankfulness, while enjoying the means, which the college affords, for his scientific enlightenment and literary culture.

Precisely here will come in, the ready objection of those, who doubt, if they do not condemn, the idea of the industrial college. "Students," they will say in the first place, "are persons, whose business is, to study, not to work at hand-work"; and, secondly, "there is not *time* enough for proper study, and for the amount of hand-labor, that you propose." The first part of the objection goes merely upon old habit and routine, and therefore may be dismissed without answer. As to the second, can any one inform us, how much time is usually spent by college students, in actual study, and how much, in that, which is neither study nor productive work? Will any one make the investigation, and give us the real figures? What is the meaning of the present fashion to have a gymnasium at every college, and why is the humblest college in New England now looking round for a benefactor (?) to make them a present of a gymnastic building and apparatus? Why do the officers and friends of the colleges encourage Ball Clubs, and Boat Clubs, and contests and races, as a part of college life? What are all these, but physical labor, and very hard labor, too?

The answer is obvious. The world is coming to find out again, what was well known to the best part of the world, thousands of years ago, but was buried for some centuries, in the cells and cloisters of monasteries—out of which the modern universities and colleges grew, by imitation—that the mind is best developed, best disciplined and best refined, where there is an even, thoroughly sustained balance of bodily vigor, and an equal exercise of the physical powers. The body and the mind, so far as the present question is concerned, are the man. These two parts of his being were made for each other. To balance them rightly, to make each one of them serve the highest uses of the other, is the highest duty that the man owes to himself, and the most fruitful cause of his mere individual enjoyment. There are the moral faculties, it is true, but if any one thinks that these, also, do not indispensably demand the equilibrium of physical vigor, let him read the history of the disease called *hypocondriasis*, for information.

Amplly sufficient medical authority declares, that much more than the usual measure of actual muscular exercise should be practised by students and persons of sedentary pursuits, and that too, in the

open air. Dr. Hubbard, of our own State, says: "Of the whole amount of time devoted both to study and to physical exercise, a full half should be given to the latter."

This topic is a most fruitful one, but it cannot be further pursued here. Only, let it be set down, that they, who maintain the truth of this proposition, do not admit, that, by such practice, there will be any diminution of good results of intellectual labor. On the contrary, they hold, that, with an even half of time given to bodily labor, the intellectual results will be actually larger, clearer, more original, spirited, sensible, effective and better in every way.

Regarding, therefore, the extent of the field of study, which the students of the industrial college, will usually attempt to go over, regarding also, the facility with which, by the conditions of the case, they will distribute their time between study and labor—it being the fundamental order of their life, that it is to be a life of both combined, and all things being arranged agreeably thereto—considering also, the amount of labor usually performed on New England farms, to the extent of procuring subsistence only, I see not what need there is for hesitation upon the question, whether or not these young men, under skilful leadership, and with a view to an honorable independence, can produce their own food, during their student-life! If the way is ever opened for the trial, I believe they will show that they can do it, and still achieve the most creditable intellectual attainment, with ample time for recreation and sport, besides.

To attempt here, to go into particular statements of *how* this thing can be done, might be only to imagine the details of an untried experiment. The treatment of such practical details, is not now of so much consequence, as it is, to secure attention to the *reasons* of the thing. It is precisely one of the cases, where it is well to spend some time upon ideas and principles, postponing the verification of them by facts, until we have tried to get at the essential logic, which lies under all facts. But there are several considerations, which may be briefly stated, as aids to reflection, upon the general case.

1. It is a prevalent custom, with most New England colleges, to have a long vacation in winter, chiefly for the purpose of enabling some of the students to spend that time, and a portion of the adjoining terms—two to four months or more—in school-keeping—that is, in *labor*, so that they may earn money to pay their college bills, the heaviest of which, is the board bill. School-keep-

ing is the only kind of productive labor, which is open to the student of the ordinary college. Here is a pregnant concession, that a young man may obtain a fair college education, and graduate with credit, notwithstanding that he takes out, absolutely, from his college life, one sixth to one third or more, of every college year, and spends it in labor. Be it observed, also, that it is the *poor* students, who do this—rarely, the gentlemen's sons—and the college systems are not without fault, that keep up such distinctions. School-keeping, it is true, has some advantages, besides the money it yields, but they are advantages that are heavily, and often unseasonably, won by young men, at *that* stage of their career. But, in the arrangements of the industrial college, why not, instead of sending the student *away* from his education, to *earn money*, to pay his board—why not let him remain, at the college, as a pleasant home, with its social and intellectual influences, producing his subsistence, then and there, by healthful labor, during some reasonable hours of every day, and save his vacation time, for its proper use?

2. In this latitude, all agricultural labor in the field, is comprised, very nearly, within the six months from the first of May to the first of November. In that half of the year, the hundreds of thousands of New England farmers, do all the field work, by which they subsist their families. For the students of the industrial college, there remains the full half year from November to May, within which, all requisite time could be obtained for that study, which, it may be supposed, should be solid and continuous, with hardly any greater amount of *indispensable* hand-labor, than what is performed by farmers' sons, who attend the winter school. Nor is it necessary to imagine that this student-life is to be six months labor, and six months study. That would be unwise and unacceptable. In the pressure of seed-time, and the pressure of harvest, some whole days might be required for continuous field-work,—although even then, as at all other seasons, it would be practicable to conduct the labor by such a system of relays, divisions and classes, that no student would be obliged to spend the whole of even a single day in the field. By the case supposed, these students are the subjects of military drill. There would be no mark or sign of military management in this field labor, but there would be the influences of order, regularity, promptitude, and the advantage of every one knowing his place. But, certainly, except at seed time and at harvest, with well disposed and well managed

young men, few days would need to be passed, in the growing season, without a share of time for study and lectures and recitations—it being observed, that for the pupils who study agriculture, specifically, a considerable part of the instruction itself will be in the field. In the winter half year, it might even be more difficult, in our latitude, to get the due amount of labor, than the due share of time for study. But there would be, the preparation of fuel, the care of the domestic animals, the fabrication and repair of implements, and all that part of the household management, not attended to by hired servants.

3. Agricultural labor, everywhere, requires, before all things else, an adequate number of *hands*. It is a hard fact in the ordinary farmer's life, that he has to work so much *alone*, or to pay wages, which exhaust his returns. But here is to be a collection of sound and vigorous workers—young men—boys, it may be, some of them—but so *many*, that if—as must always be understood—they are well directed, they can go over scores of acres, where the single-handed farmer, hardly gets over one. Well furnished with implements and animals, they could gather the whole hay crop in three days of sunshine. Whether in the infancy of the industrial college, in its days of experiment and struggle, it could afford a full equipment of labor-saving and *time-saving* machinery, may be uncertain. But the economy of many hands, would be an established fact, in the case, at any rate.

In due time, no doubt, they would have the aid of the improved agricultural machinery, by which so vast a difference is made between field work now, and what it used to be; and these young men would thus be masters of the situation, and would be at no loss to find time for intellectual pursuits, nearly every day, in the intervals of the light and rapid labor, performed with the aid of such machines.

4. It would, probably, follow, as a necessary arrangement, where there is a collective subsistence out of a common stock, that some rules of uniformity, such as the principle of the ration, and the principle of the mess, should be observed, with more or less strictness—an arrangement, also, of commissaries and stewards—in which capacities, the students themselves should be trained,—all which methods, would tend to promote economy, effectiveness and contentment.

5. It is not to be assumed, that the food department would be like the arrangements of a hotel, or of a six or seven dollar board-

ing-house. As a matter of course, the food of the students must be plain, but there is no reason why it should not be perfectly good, wholesome and palatable, and well cured and well cooked. As to quality, it would be very much within their own control. They would soon learn—what so many are ignorant of—that it does not require any more labor—if only a skilful intelligence directs the work—to produce a good material for food, than it does to produce the inferior. Nor would their table need to be without some luxuries. What hindrance would there be in the way of supplying such a commissariat, with choice fruits of the garden and the orchard, without any money cost, after the trees, and fruit-bearing shrubs and plants are once procured, and begin to yield?

6. Such a system would, of course, require a stock of provisions, or some kind of subsistence fund to begin with—an object, which might be attained in various ways. One method might be, an advance of a certain sum of money, by every student on entering, to cover the first several weeks. But the advantages of simplicity and ultimate uniformity would justify the attempt to provide this preliminary resource, out of some general fund or means.

The casualty of unfavorable years would have to be considered in all calculations. If it should be found practicable, in an average season, to produce *enough*, reasonable effort and skill would take advantage of all favoring opportunities to produce something more. And since some of the food-crops cannot be kept over, surpluses of that kind, would, naturally be disposed of, for money or its equivalent, thus laying the foundation for a subsistence fund. Specific and distinct accounts of such a fund would require to be kept, with rigorous care, and the whole gains reserved for the necessities of unfavorable years. If it is worth while to imagine that this fund might become unduly large, it is equally easy to anticipate methods, by which it might be restored to a proper measure.

7. No such result as the self subsistence of the students of an industrial college can, by any possibility, be accomplished, without a peculiar degree of administrative ability in the governing power of the college. Every other kind of ability, every other form of learning and culture, every other shape of official authority and dignity, would be useless, to *this* end, without a special and superior executive aptitude, inventiveness, firmness and per-

severance. If, under such direction, the experiment should succeed, how great would be the influence of such faculties and forces, in shaping the habits and developing the resources of ingenuous young men! Such influences would not only help them to procure their bread, for the time, but would be like wells of water, nourishing all their future lives.

One or two explanatory statements may be advisable, to guard against misunderstanding.

1. The productive agricultural labor, of which I have been treating, belongs to the economics of the industrial college—not to the department of scientific instruction. The experimental work upon the land, for the purpose of discovering the scientific laws of production, and the best application of scientific principles to practice, is another matter. That is a business of instruction, and belongs to the same department with text-books and lectures and recitations. Scientific experiments upon land often produce nothing but scientific truths, or merely expose theoretical errors. And yet, I suppose, that a young man, working one part of the day, in one field, to produce a crop for his own subsistence, and watching and studying at another hour, in another plat, the progress and details of a scientific experiment, from which he might hope to learn how to produce the same crop, the next year, with less labor, or with richer yield, would find his two pursuits agreeably blending together, and each adding interest and satisfaction to the other.

2. I have not forgotten, that the students of the industrial college, are not all to be farmers. Mechanics also, and persons of other industries, besides agriculture, are to be educated. The purely scientific study of cultivation, whether in the class-room, or in the field, is the business only of that part of the students, who are devoting themselves to agricultural life. But the young mechanics, and the young sailors, must have their food, while getting their education, as well as the young farmer. One of them is quite as likely to be without cash means to pay for his board, as the other, and all of them, will have equal intervals of time, not requiring to be occupied in mere study. All will be members, also, in the same household arrangements, and share together, in a common social life, during their career of education. The problem, therefore, of self-subsistence, is the same for all of them, and I see no reason, why they should not work it out together. Working together for their food, they will divide, in their study hours,

into their several departments, and courses of scientific enlightenment, yet coming together, again, constantly, in those general studies, which tend to promote the liberal culture of all of them alike.

Nor can I see, that any one of them, whatever his ultimate pursuit, will have suffered any loss, by devoting such a part of his college life, to the cultivation of the ground. They will have settled their habits of industry, they will the more surely have gained the all-important knowledge of the value of productive labor, they will have learned, it is to be hoped, the vast difference between labor, which is skilful, and that which is mere drudgery, and, if successful, they will have won the life-long satisfaction of independence and self-respect.

In the rapidly shifting forms and fortunes of life, in communities like ours, and in a new country, where every possible industry is in demand, and where individual or social needs induce constant changes of pursuit, and require so many combinations of faculties, it never can be an injury or a loss to a mechanic, that, in his early life, he had some good, practical training in agriculture.

The proposition may be stated in far wider and bolder terms. Among all the multitudes of men, not devoted to agriculture, there does not live upon the face of the earth, a single man, physically sound, from kings and emperors, down to the lazzaroni in the gutters, to whom it would not have been an advantage, if, at some time in his life, he had practised the art of producing his own bread, out of the earth, by the labor of his own hands.

P. BARNES.

Portland, Dec. 6, 1866.

Until very recently, a confident expectation has been entertained of being able to present here a report of the progress of the State College of Agriculture and the Mechanic Arts from the pen of the President of the Board of its Trustees.

Although circumstances prevent its completion in time to appear in these pages, such a report may yet be expected during the early part of the session of the Legislature, and such being the case, there appears an obvious impropriety in any attempt on my part to anticipate its statements, views and recommendations.

No one who has followed the very able writer of the next preceding article in his presentation of the subject, can fail to perceive in some good degree, the novelty, the magnitude and the difficulty of the problem, the working out of which is put in charge of this Board of Trustees. To those who are impatient of delay, and desire speedy results, we respectfully suggest that the class of institutions called into existence by the act of Congress is wholly unique, that there are no precedents by which to be instructed, and that great danger exists of falling into errors more or less injurious; consequently it is the part of wisdom to exercise great caution and deliberation in the adoption of the means to be used to carry out the trust.

I will merely remark that in the early part of the past year the location at Orono, in Penobscot county, was decided upon, and that progress has been made on other points connected with the establishment of the Institution.

The operations of the County Agricultural Societies during the present year, have exhibited considerably more of energy and activity than was manifested during some years previous. This was naturally to be expected, for during the four or five preceding years the attention of all was so deeply engrossed by the tremendous struggle for self-preservation and liberty through which our beloved country was passing, so much of anxious thought and care was compelled to be given to matters related thereto, so much of sacrifice in varied forms was imperatively called for, that whatever else could, for the moment, be laid aside, must needs give place to the urgent demands of the hour.

Those years, however, have left a deep and broad mark upon agricultural progress in Maine. The necessity of obtaining food

for man and beast and means to meet the numberless calls, and this too with a diminished expenditure of human labor, led to the introduction and extensive employment of time-saving and labor-saving implements and machinery, and to greater skill in the numerous operations of husbandry.

Especially may the influence of these years be seen in the rapid extension and increase of sheep husbandry, and in the improvement of breeds of this invaluable domestic animal. This extension and improvement received great encouragement from the probability, and I may say, confident expectation, that the national requirements for revenue would insure a tariff upon wool which would yield a steady and sufficient protection to the home grower, so as to enable him to compete with production in those more favored foreign countries where neither shelter nor harvesting and housing of food for half the year are required. I regret to learn that doubts are entertained whether such a tariff may be adopted; and this not merely because the failure to secure a protective duty upon foreign wool would result in the sinking of a large amount of capital invested by the farmers of Maine; but also, because sheep husbandry is so valuable an agency for the elevation of agriculture in a country of moderate natural fertility like ours, that it can hardly be dispensed with and success attained by other means.

By the agency of the sheep, a great amount of herbage, of a quality which would serve but poorly for any other domestic animal, is readily converted into good meat and wool and manure; and thus we are at once furnished with food and the material for raiment, and with means of fertilization which will insure an increase of food in years to come.

Let the price of wool be so reduced that the farmer becomes constrained to discard the sheep, and it is easy to see that great loss, both direct and indirect, must ensue. What can be more reasonable than the demand, that, in levying the burdens which must be borne, they be so adjusted as to yield all the advantages which the nature of the case admits? I cannot relinquish the hope that such will be the fact, and that adequate protection will be steadily continued for many years to come.

S. L. GOODALE,

Secretary of the Board of Agriculture.

JANUARY, 1867. ,

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BRAHMA FOWLS---TAKEN FROM LIFE.
Stock of H. G. White, South Framingham, Mass.

ABSTRACT OF RETURNS

FROM THE

AGRICULTURAL SOCIETIES

OF

MAINE.

1866.

EDITED BY
STEPHEN L. GOODALE,
SECRETARY OF BOARD OF AGRICULTURE.

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ANDROSCOGGIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

I herewith transmit a statement of the success and doings of this Society for the year 1866.

The Annual Show and Fair was held at Lewiston, October 2d and 3d. The weather and travelling were excellent, and we had one of the best exhibitions held since the organization of the Society, both as regards the show of stock and the display of manufactured articles.

The receipts of the Society were less than last year, but the expenditures being less, the balance will show as favorably as then.

The hay crop of this county is less than last year, probably not exceeding in quantity three-fourths of the preceding crop, but the quality has never been surpassed.

The season was very favorable for the growth of the potato, and an abundant crop has been secured.

The corn crop has been very good, both in quantity and quality.

Wheat yielded fairly, though there was but little sown. Owing to the elements of production that were stored up by the soil when first brought into a state of cultivation having been exhausted, and the necessary compensations not having been given to it, this valuable crop has ceased to be of any great comparative value in this section.

The barley and oat crops were large and rarely excelled.

Nature has been more lavish with regard to the fruit crop the present year than the preceding, yielding the farmers of this county an abundant harvest.

There were ninety entries of neat stock "presenting, by general consent, the finest show of the kind ever exhibited on the Society's grounds."

Four town teams of oxen, of twelve yokes and over, were entered. These teams were made up of some of the finest oxen that have ever been exhibited, showing that there has been a decided improvement in the breed of these animals.

Two town teams of steers, of eight yokes and over, were also entered. They were fine looking and well built.

The exhibition of milch cows was good, there being twelve entries. Mr. Rollins of Lewiston entered a valuable grade Jersey cow and calf. He stated that from the milk of the cow two hundred and seventy-two pounds of butter were made in six months, and eleven pounds during the week preceding the Show.

Sixteen bulls were on exhibition, all fine animals. The Jersey bull entered by H. H. Dickey was one of the best we have ever seen.

The exhibition of sheep, swine and poultry was good. It is evident that since the close of the war the rearing of sheep has received less attention than during its progress.

There were fifty-four horses and colts on the grounds. Many of them were very fine animals, giving evidence of superior breeding, and that much attention has been paid to this branch of stock growing.

The exhibition of dairy products was worthy of regard, there being forty-seven entries of bread, butter and cheese, all of which were of superior excellence.

The entries of household manufactures were larger in number than last year, showing that the ladies were much in advance of the "lords of creation" in their contributions to the exhibition. A very commendable spirit of rivalry was manifested from old and young in the manufacture of articles for domestic use, entries having been made by ladies of eighty and misses of five, nine and eleven years, all of which discovered commendable skill; and from examination we became convinced that if any lack of interest is ever manifested in our County Fair it will not be chargeable to the ladies who fill this department.

The manufactured goods exhibited by N. W. Farwell, from their beauty and finish called forth general commendation, and contributed greatly to the attraction of the Fair.

The show of fruit was good in quality but deficient in quantity. Several superior varieties of apples were shown. Mr. Thomas Herbert of Bristol, Lincoln county, exhibited eleven varieties of pears, all of fine quality and adapted to this State.

There was a good display of agricultural implements. Messrs. O. E. Randall, John N. Wood and W. W. Wood exhibited the admirable horse-rake patented by Mr. Randall in 1865. This is regarded as the best horse-rake in the market.

Potter & Thompson exhibited several of their splendid carriages.

Our Show and Fair the present year, as a whole, fully realized our anticipations, and proved that the farmers *do* derive benefit from these yearly gatherings; but we wish to see still more unanimity, more interest and more zeal in behalf of this Society, in order to promote their own welfare.

Amount of premiums offered, \$558; amount of premiums awarded, \$411.

NELSON HAM, *Secretary.*

ARROSTOOK COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

I transmit with this our annual statement of "financial condition and doings." We do not show so large a sum of money raised this year as last, but we have been prospered during the year, and our Cattle Show in September was much superior to the first one, held a year before.

The Society has already excited new interest among the farmers, and a Farmer's Club was started last winter in West Houlton, a direct outgrowth of the Society's influence. I hope the example set by the Hancock County Society may be adopted by our own, and that we shall have those public discussions, which must be so very beneficial to all who attend.

I had hoped to make quite a lengthened report this year upon some topics of local interest, and compare our condition, as regards facility of production and cost of same, with older parts of the State. The brief time now at my command forbids much attention to these things. I have been very busy in setting up a "Beater Hay Press" the last few weeks, and its relations to our agricultural interests are so intimate that I speak of the matter in this Report.

We can easily produce excessive crops of hay in our fertile, easily-worked fields; but up to this time there has been no cash market for it. Stimulated to the experiment by the near approach of good railroad connections with Calais and St. Stephen, we have set up the press, and believe we shall build up a good business.

There is danger that heedless men may sell hay to the injury of their farms, but our lands are so productive that we may well sell a good deal of this most valuable commodity.

Our Annual Address this year was delivered by Hon. P. Barnes of Portland. It set our farmers to thinking, and I notice that many are carrying its theory into practice this fall. (See page 99 of Report on autumn cultivation.)

I am satisfied that to prepare the ground in the fall is the true way of doing the work, and in so doing we but make the best use of nature's coöperation in the work of producing food for man and beast.

I hope another year to be more at leisure to enter into matters of interest to ourselves and others seeking information about the advantages and capabilities of Aroostook county.

Amount of premiums offered, \$266; amount of premiums awarded, \$134.

FRANCIS BARNES, *Secretary*.

CUMBERLAND COUNTY AGRICULTURAL SOCIETY.

This Society had made due preparations to hold its Annual Fair in Portland, but the great fire of July 4th and 5th prevented the arrangements from being carried out, and none was held.

PORTLAND HORTICULTURAL SOCIETY.

This active and efficient Society, notwithstanding the total destruction of its flower stands, cases, glass ware, vases and other furniture, held an autumnal Show, which was as successful as the unusually limited accommodations at their command would permit.

Amount offered, \$347; amount awarded, \$233.

HANCOCK AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Of our Society I am able to make a favorable report. It has been in operation nine years, and numbers some five hundred members. It has gradually progressed from a small beginning—having but thirty-seven members at the date of its organization—meeting and overcoming the obstacles in its progress with a steady perseverance. Opposition is gradually dying out, “and the few left will be laid aside soon, like fossils in the new alluvia now forming.”

Very few county agricultural societies can show a better financial condition. The balance due upon the land is now quite small, and the prospect is good that we shall soon be free from debt.

We have a large fair ground fenced and suitable buildings thereon.

Its Ninth Annual Fair continued through three days. Although the weather was for the greater part of the time very unfavorable, the Exhibition was the largest and best ever held under the auspices of the Society. While the old competitors, farmers and farmer's wives, were present with their stock, and specimens of handiwork, many new faces were to be seen in the jostling crowd. Nearly every one seemed good-natured, interested and pleased. The listless lookers-on, and the *wet blanket* men, will soon only be known in antiquated history.

The number of entries far exceeded that of any preceding year.

The benign influences of the Society are seen, felt and acknowledged, not only within the entire circle of which it is the centre, but diffused over the face of the entire county. It is to be seen in better stock, improved farms and larger crops. The improvement in our stock is very manifest. We have, as yet, but few “Herd Book” animals, but such as we have are excellent representatives of their class. Of grades, no county has, we think, excelled us in the same period of time. Nine years ago, at the date of the organization of the Society, not a pure bred animal was known, as such, within the limits of the county.

The old proverb “every crow thinks its own young the whitest,” was universally adopted; each owner looked upon his own “na-

tives" as the best cattle in the county. These annual gatherings have disabused the farmers of such faulty ideas, and substituted both a demand for and a supply of known valuable stock. There is yet a wide margin for improvements, but in view of the progress already made is hope for a brighter future. The good work thus begun cannot "breed back" again.

The samples of farm products displayed far exceeded in value and number those of any former year, with the exception of corn. The wet season made this crop a failure.

Perhaps no one cultivated crop has received such an impetus, and the culture of which affords such ample returns, as that of the cranberry. For the first few years only now and then a solitary claimant for the exceedingly liberal premiums to encourage its cultivation; now there are more exhibitors and competitors for the premiums offered for cranberries than for any other field crop; and every year is adding its quota to the list of successful producers.

Last year, for the first time, premiums were offered "on farms," the awards to be made at the close of the third year. Thirteen were entered, which has stirred up a very commendable spirit of rivalry.

This year we are attempting the experiment of agricultural discussions, under the auspices of the Trustees, with what success remains to be seen.

That our Society is still advancing in its usefulness is evident to all, by the introduction and rearing of the improved breeds of domestic animals, the more thorough cultivation of the soil, the introduction of improved implements of husbandry, and the different varieties of roots, grain and fruit. We are better prepared to meet the wants of all, and inspire confidence in our ability to secure greater results from our future labors.

Amount of premiums offered, \$1061; amount of premiums awarded, \$738.

SAMUEL WASSON, *Secretary.*

Ellsworth, Nov. 30, 1866.

KENNEBEC COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Another year has passed, and we are to report what has been presented to us from the Giver of all our blessings.

Never since our recollection has there been a season when the labors of the husbandman in this section have been more signally blessed. The season for putting the seed into the ground was unusually favorable. In most cases the blade soon appeared, in a few instances, however, the weather proved too dry or the planting too shallow, but there was hardly a single piece of land that did not produce the desired crop. Then the hoeing and harvesting seasons were equally favorable, especially for the hay crop, which has been pronounced to be, by many competent judges, equal to that of last year, although not so much in bulk, yet in weight and quality enough better to make it equal, or even better.

The apple crop has been equal to the most insatiate desire of the farmer, and the prices have been such that the avarice of many has tempted them to palm off on the buyer, as fruit of the first quality, apples that had it not been for their own mark, which they were obliged to place on their barrels, they would have denied as ever having come from their orchards, and would denounce the man that would offer such fruit for sale as wanting in common *honesty* (and this would be a mild term). Probably there never has been as much money brought in this county in one season before for this one product.

The cranberry is also receiving some attention. Mr. Isaac Foster of Winthrop has a small patch of land which a few years ago produced nothing but alders and some coarse swamp grass, this year yielded him about thirty bushels of very nice cranberries, equal to any that are brought into our market from other States. These gave him a very large profit on all his outlay. Others are following his example, and I doubt not will meet with good success.

Our Show and Fair was all that we could reasonably ask it to be. The weather delightful, attendance good, entries and exhibition of almost everything within our limits, except milch cows, truly commendable. The show of oxen was never equalled before

at any of our exhibitions. It was estimated by the Committee that there were over twenty thousand dollars (\$20,000) worth of oxen present.

The prize for the best working oxen was strongly contested, and excited much interest.

There were a few good milch cows present, but the excuse of the dairyman is, that no premium can be offered by any County Agricultural Society that will compensate him for driving his best cows to the Show. How far this is true I will not pretend to say. Good cows are not likely to be benefited much by being driven from home, I will admit; yet there are some who look a little beyond present self-interest.

The show in the dairy products, particularly in butter, was excellent, never better; at the close much was sold for large prices. The cheese was thought by some not to be quite equal to that of former years, yet very fair.

The ladies department of household manufactures was in many respects truly superb. The really useful articles, such as quilts, blankets, socks, hose, mittens, &c., &c., were there in great abundance, and the ornamental kept pace with the useful.

The department of fruits and flowers was never excelled—the flowers never equalled at any Show of ours for their number, variety and perfection, which attracted much attention, and added much to the beauty.

The Address before the Society, delivered by W. B. Snell, Esq., Preceptor of Monmouth Academy, was full of interest and eloquence. It was listened to by a large and appreciative audience. The singing was by a choir from Fayette, led by F. A. Chase, Esq., which gave much interest to the occasion.

The Society was never more prosperous than at present—peace and harmony existing to a greater extent than it is the common lot of agricultural societies to enjoy.

We are out of debt, and have a small sum in our treasury. Our land is leased for a term of years, and enclosed with a good tight fence, having a trotting-park one half mile in length. Also a substantial Show Building, with suitable rooms for Secretary, &c., not yet owned by the Society, but which probably soon will be.

Amount of premiums offered, \$408; amount of premiums awarded, \$309.

DAVID CARGILL, *Secretary.*

NORTH KENNEBEC AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The show of live stock this year was unquestionably the largest and best we ever had ; while the exhibition at the Hall was, on the whole, very satisfactory ; for, although some of its departments were but sparsely supplied, others were full to overflowing. The attendance, however was smaller than last year, and although as many membership tickets were sold, yet the receipts fell off about fifty dollars. This was the result of two causes : 1st. The pleasant weather with which we were favored, followed a long period of rain, and farmers felt it their duty to improve it at home in securing their crops ; and 2d. There were three agricultural exhibitions in the county ; one in Skowhegan, and a town show in China, in our immediate vicinity on the first day. If the arrangement of these exhibitions are measurably within the control of the Secretary of the Board of Agriculture, it would seem to be demanded of him that he should interfere to prevent a conjunction so undesirable, in the future.* Many persons would be glad to attend each of these three exhibitions, who, with the existing arrangement, find it impossible to be present at more than one. The time of holding our show has been the same ever since the organization of the society, and latterly the other societies have selected the same week.

All departments of live stock were unusually full, and the improvement in quality, as compared with our earlier exhibitions, furnished gratifying evidence of the usefulness of our organization. The number of horses, in all the classes, fell but little short of a hundred ; and the most pleasing feature of this department, (characterizing other departments, also,) was the superiority of the young over the old. A great advance has been made in this interest throughout the whole State, and in no part of it are good horses and promising colts plentier than in the valley of the Kennebec.

* It is in no measure under the control either of the Secretary alone, or of the Board of Agriculture as a whole. The matter has been agitated at several sessions, but upon a full comparison of views, action was deemed inexpedient by a majority of the members.

The display of neat stock was also a triumph in number and quality. Six competitors, Samuel Taylor, Warren Percival, Geo. Rice, Henry Taylor, H. C. Burleigh and Wm. Nowell, entered the lists for the herd premiums, bringing, in the aggregate, eighty-six animals, ranging from thorough-bred to native. Mr. Percival's twenty-eight choice Durhams, all herd-book animals, made no small exhibition by themselves, and were highly creditable to the enterprise of this well-known stock grower; but we fear that the merits of his stock were not fully appreciated by all the committees to whom they were submitted. The number of thorough-bred bulls on the ground was large, with many fine grade animals; and the long rows of noble oxen made a gratifying sight. The show of cows was superior to any former exhibition, and included several choice Jerseys, which continue to grow in favor. The Heifers numbered forty-two, and gave evidence that an abundance of good cows are growing, and that butter ought to be cheaper at some time.

The number of sheep was double that of any former show; and we think there has been a greater growth and concentration of interest in this department than in any other within the province of the Society. As evidence of this, may be mentioned the organization of the "North Kennebec Wool Growers' Association," which commenced active operations last Spring, with a remarkably interesting and successful sheep-shearing festival at Waterville. The advent of the "Green Mountain Boy," too,—a choice thorough-bred Merino buck, brought here by Eph. Maxham, the equal of which, considering his age, build, fleece, and stock-getting properties, was probably not left in Vermont, his native State—has given a wonderful start to the sheep fever in this section. This animal was present at the exhibition, with several of the noted "Ladd Bucks," from New Sharon, and other choice specimens. George Richardson & Son, John Athearn, A. G. Ricker and Dr. N. R. Boutelle, presented flocks of choice Merinoes; Joseph Percival and George W. Hubbard, competed in coarse wools; Mr. H. G. Abbott was present with his large and choice flock of medium wools, which were admired by all who saw them. The grade of sheep which he thinks he has established, is that happy medium that just fills the eye of a large majority of our farmers.

The show of swine was unusually large, and embraced specimens of Suffolks, Chesters, Prince Alberts, and two Province shotes, presented by W. A. P. Dillingham.

In the Poultry department, too, there were large numbers of choice representatives of all classes, and a very interesting exhibition.

The Fair at the Hall, which opened as usual, on Tuesday evening with a pleasant social gathering, enlivened by music from Mrs. H. Taylor, Mrs. L. A. Dow, Miss Lucy Carroll, Miss Abby M. Hawes, and others, was one of which we had no reason to feel ashamed. To be sure, the supply of domestic manufactures, though fair, was not large; but the full display of fruit, dairy products, samples of crops, fine arts, miscellaneous articles, etc., made ample amends; and the display of farm implements by Messrs. W. A. P. Dillingham and Joseph Percival, was such as never greeted the eyes of visitors at any previous exhibition.

The central point of attraction in the Hall, was a large table of agricultural products, from the farm and garden of Hon. W. A. P. Dillingham, which of itself would have saved the exhibition from failure. It embraced fine samples of wheat, corn, pumpkins, squashes, three varieties of potatoes, four of beets, cabbages, carrots, eleven kinds of choice apples, five of grapes, tomatoes, jars of butter, several bouquets of cut flowers, etc. In addition to a liberal gratuity, the Society very properly tendered him their hearty thanks for this large contribution.

The contributors to the Fruit department, included those original members and early supporters of the Society, the brothers Taylor, Samuel and Joseph, Hiram Cornforth, Stephen Nichols, W. A. P. Dillingham, George Richardson, Galen Hoxie; and last, but not least, though ruling over a small village garden, Lemuel Dunbar.

The department of Fine Arts, embraced many rare gems of beauty, prominent among which may be mentioned the large collection of photographs, presented by Mr. O. J. Pierce, of Waterville; many of which are faithful copies of pictures and statues that have a world-wide reputation. By the introduction of these gems of art into the homes of the people, he is doing much to elevate and refine society, and to a certain extent, should be regarded as a public benefactor and encouraged and rewarded accordingly.

Of the numerous articles in the Miscellaneous department, many of which were curious and interesting, we will mention only two contributions,—a collection of insects made by Master Edson F. Hitchings, and a rustic chair and sofa, constructed from the twisted roots of trees, by Joseph Taylor of Belgrade. The sculptor, who

in a rough block of marble, sees an angel, is pronounced a genius; and it must have been something akin to the divine quality of mind and soul possessed by the true artist, that enabled friend Taylor to see these beautiful and curious pieces of furniture in the tangled maze of roots, with no form nor comeliness to a man less gifted to discover beauty and harmony everywhere. They excited the wonder and admiration of all beholders, as rare products of mechanical genius, artistic taste, and patient labor; and the committee very fittingly awarded to them a copy of Whittier's poems, which we know the recipients will prize much beyond its value in money.

The Trustees having fixed the premiums on a very liberal scale this year, and there being a falling off in the attendance, our receipts are not sufficient to meet the awards and incidental expenses by a little over a hundred dollars; but we have no debt to provide for, and there is money enough in the treasury to satisfy all lawful demands upon it.

This year, as in former years, we have had trouble in filling our committees with the right kind of men, who, with proper notice of their appointment, would come prepared with carefully considered and well digested thoughts bearing upon the particular department assigned them, the presentation of which, on the last day of the exhibition would furnish a very good substitute for a set address. Those originally appointed and notified, too often fail to appear, and their places are filled at short notice by others, who are not prepared, even if they possess the proper qualifications for the labor thrust upon them with so short notice. As a consequence, therefore, many of the reports are very meagre, containing little beyond the bare awards, with no adequate notice of the animals or articles submitted to their inspection, while those which fail to take a premium are too frequently ignored altogether. To this, however, we are pleased to say, there are honorable exceptions in men who have served the Society faithfully and conscientiously, year after year, with no reward but the gratifying consciousness of performing their duty. May they long be spared to bless the Society; and let us pray for more like them, to labor by their side and to fill their place when they shall be called hence.

Amount of premiums offered, \$675. Amount of premiums awarded, \$466.

DANIEL R. WING, *Secretary*.

KENNEBEC UNION AGRICULTURAL AND HORTICULTURAL SOCIETY.

From the Secretary, Mr. S. Smiley, we have the following :

The Kennebec Union Agricultural and Horticultural Society held its Annual Cattle Show and Fair at Gardiner, Oct. 2d and 3d, A. D. 1866.

The weather was favorable, and the display of manufactures and fruit was as large as has been made by the Society for the past three years.

The number of cattle, horses, sheep and swine was not so great as should have been exhibited by this Society.

Amount of premiums offered, \$575; amount of premiums awarded, \$353.

The following statement of remarkable yield of a cow is from the pen of Nathan Foster, and is quoted from the report of a Committee of which he was chairman :

The writer of this report, without consultation with the other members of the Committee, append the statement of Mr. Benjamin Lawrence of Gardiner, in relation to his cow, which carried the Society's first prize last year. She being lame was not present this year. The cow was ten years old last spring, dropped her calf late in April, and in seventeen weeks, commencing the 5th of May, were made from her milk 210½ pounds of butter, a family of four persons being liberally supplied with milk and cream during the time from the same cow—being a fraction over 1 lb. 12 oz. per day. In seventeen days in June 46 lbs. of butter were produced—2 lbs. 11 oz. and a fraction per day.

Her keeping after turning to pasture in the spring was pasturage only, till within the last three weeks six quarts of coarse shorts have been added daily. She is now giving sixteen quarts of milk, beer measure, per day.

This cow when exhibited last year was represented to be a grade Jersey, Mr. Lawrence believing her to be so. In conversation with him recently I learn her dam was driven by himself to Mr. Gardiner's farm for this calf. At that time (eleven years ago) the farm was under my care, and the only animal for that kind of service on the farm was a half blood Ayrshire, from my grade

Durham cow, which I kept till twenty years old. For the production of butter I have no recollection of seeing the cow, or a reliable statement of one, the equal of this in the county or the State. Mr. Bontelle of Waterville exhibited at the North Kennebec Show, some years ago, a full blood Ayrshire, a much smaller cow than this, which had given twenty-one pounds of butter in seven days. But one and three-fourths pounds of butter per day, for one hundred and nineteen days, and still giving milk enough to continue the same quantity longer, is "hard to beat."

LINCOLN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Fair of our Society was held at Waldoboro' Oct. 3d, 4th and 5th, and was well attended. Our show of stock was not large, but of good quality for this locality, especially the young stock. The same remark applies to horses and colts. A gradual improvement has been going on in these departments for some years.

Our show of grain and root crops was superior to that of any previous year. Our samples of corn were very fine, quite a number of large crops, well ripened, having been raised in this vicinity.

Of fruit there was a large quantity and in excellent condition. This department is one of the main and most attractive features of our indoor exhibitions.

Our Exhibition the present year we think fully up, and in some departments superior, to any previous Fair of this Society.

Amount of premiums offered, \$650; amount of premiums awarded, \$488.

C. C. ATWELL, *Secretary.*

OXFORD COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The twenty-fourth Annual Show and Fair of this Society was held Oct. 9th, 10th and 11th, 1866. The weather was favorable, and the number of visitors large. The exhibition of stock-horses, trotting-horses, mares and horses and colts was large, there being fifty-six entries, embracing many fine specimens. The trotting was spirited, and appeared to interest a large crowd of visitors. The entries for neat stock were numerous, embracing twenty yokes of working-oxen, two herds, three town teams, and a number of bulls, steers, cows and heifers. The exhibition of neat stock constitutes an important part of our Shows. The number of sheep entered was small. No swine were exhibited. The display of dairy products, although not large, contained some very nice specimens of both butter and cheese. The present high prices of the products of the dairy ought to be a sufficient inducement to our farmers to enlarge their operations in this department. The competition for premiums on field crops is not what the importance of the subjects requires. Applicants for premiums on crops frequently make entries at the time of the fair, but neglect to make the subsequent statements required by law. C. H. Durell of Paris raised 50½ bushels of excellent wheat on two acres, and William Frost, Jr., of Norway raised 240 bushels of ears of corn on one acre. An abundant crop of corn has been harvested in this vicinity the present fall, and though not so fully matured as the crop of 1865, still the average quality is good. The wheat crop was better than it has been for many years. The exhibition of fruit was large and the quality good. Uriah H. Upton of Norway presented thirty-one varieties of winter and twenty-two varieties of fall fruit. William R. Swan of Paris presented twelve varieties of winter and eight varieties of fall fruit. In addition to apples, specimens of pears, grapes, plums and cranberries were presented. Numerous specimens of vegetables were exhibited, among them a squash by Rev. Ransom Dunham of Bryant's Pond, which weighed 195 pounds. The display of domestic manufactures was not so large as at some previous Shows, but some nice

specimens were to be seen. Some good articles of agricultural implements, such as plows, horse-hoes and horse hay rakes, were entered, besides a large number of smaller articles. Fifty-four entries were made under the head of miscellaneous. On the whole, our Show of the present year has been a successful one.

Amount of premiums offered, \$278; amount of premiums awarded, \$263.

ELLIOT SMITH, *Secretary.*

WEST OXFORD AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Sixteenth Annual Exhibition of this Society was held at their grounds in Fryeburg, Oct. 9th, 10th and 11th. The weather was favorable, and as many, or perhaps more, were in attendance than any year preceding, as the receipts were larger.

There were on exhibition not as many live animals as have been presented at some former Fairs, but the quality suffered no depreciation. The amount of premiums offered by the Society for horses was \$57.50; the amount awarded \$29.00. The amount offered for neat stock, \$115.75; the amount awarded, \$46.50. This falling off is certainly not owing to any diminution in number of good animals within its limits. Horses are owned hereabouts for which \$1500 is said to have been refused, and within sight of their grounds an ox team of ten or a dozen yokes, all above seven feet, could have been collected, and yet neither were present.

Dairy products appeared in abundance and merit. Sixteen dollars were awarded in this department.

The housewives and the ladies in general filled the hall with generous displays of articles of domestic and fancy manufacture. This has always been a prominent feature in our Fairs, and may it not depreciate in future. The high prices of woollen and cotton fabrics have stimulated many to ply the wheel and the loom anew, and not a few of the younger members have learned for the first time what music there is in their hum, and economy and comfort in their products.

Fruit was never presented in more pleasing variety. One man exhibited nearly sixty varieties of apples, several of pears and

grapes, and other exhibitors equalled him in quality if not in numbers. Many are paying particular attention to their fruit trees, and no doubt will find it highly promotive of enjoyment, economy and health.

The maple, too, must not be left out of consideration. There are within the limits of this Society thousands and thousands of trees which yield annually more syrup and sugar than we believe can be offered by any other society. Some splendid samples were exhibited, much of the sugar appearing almost as white as the refined sugars of the market, yet we think a large portion of that delicious flavor is extracted by such thorough bleaching.

In making the abstract more general, we may add that the labors of the husbandman for the past year in this region have been pretty liberally rewarded in an abundant harvest. Most of the leading crops were above the average, if perhaps we except hay. This, owing to previous dry seasons, winter-killing, and last, though by no means least, the destructive influence of myriads of grasshoppers, was somewhat of a failure. Much that was gathered was poorly prepared for the barn, owing to the continued falling weather throughout the season. Mowing and raking machines are numerous used, there being about one hundred of the former owned and used in the town of Fryeburg alone. Some other towns are not quite so favorably situated for its general introduction.

Of corn, next in importance, there was a good crop, though not up to the expectations of the farmers earlier in the season. A cold and wet September interfered materially with its full development.

Potatoes were exceedingly good in quality and quantity. The horse-hoe is being somewhat introduced now in their culture as well as corn.

Grain abundant, but little wheat, however, has been sown for a number of years, the main crops being oats and rye.

The prices of all products of the farm are yet in high figures, notwithstanding their abundance, and we can see no reason why farmers are not a happy and prosperous people, unless, indeed, it be just now they suffer from undue plethora of purse.

But after all the abundance the earth yieldeth and the yeoman's thrift, there is a hesitancy, a lack of interest in them to bring such forward and compete for premiums. Perhaps the premiums are

not *large* enough to satisfy them. If the object is a *great gain*, certainly they are not. Most societies in their infancy struggle with a load of debt, and can ill afford to make an attractive premium list. This has been the case with this organization; but we are now in a better financial condition—out of debt. We have therefore revised and raised the premiums, and shall, as further prosperity allows, offer still larger inducements. Shall try the experiment of holding the next exhibition for two days instead of three; and we hope that our present prosperity may be only a dawn, which will grow to a glorious noontide.

Amount of premiums offered, \$364; amount of premiums awarded, \$223.

D. LOWELL LAMSON, *Secretary*.

EAST OXFORD AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Our Sixth Annual Exhibition was held at Canton. The morning of the first day was occupied by a business meeting of the Society, for the choice of officers, etc. The exhibition of neat stock and sheep, examination of the same by committees, plowing and drawing match, occupied the remainder of the day. The number of working oxen entered was large, many of which were of superior quality. The town teams from Livermore, Hartford and Canton, were splendid. Beef cattle and steers were well represented; of cows and heifers the exhibition was not so good, though the high price of butter and cheese would seem to be a sufficient inducement for farmers to give particular attention to the improvement of dairy stock. There was a better exhibition in the sheep department than usual, though small yet. We have not given so much attention to the raising of sheep in this section as in many other sections of this State, but the interest in this department is on the increase, and quite a number of improved breeds of bucks were exhibited. Two teams plowed with good success, and gave general satisfaction. The drawing, with oxen, of a large load of stone on a drag, attracted considerable attention, especially a class of curiosity seekers, but by the more candid persons this practice is

looked upon unfavorably. Would it not be better to give this attention to the best disciplined oxen, that would do the usual work of the farm in the most quiet and best manner, and not grant a premium to him who by the utmost possible exhibition of nerve of himself and oxen could barely start the most load?

The exhibition of horses and colts, of which there was a fair show, came off the morning of the second day. The Society and citizens met at 11 o'clock, to hear the Agricultural Address, by Albion Thorn, Esq., of Canton, which was able and instructive. There appears to be a lack of interest in the department of grain, roots, etc., so that we get but very few applications for premiums on corn and grain, or roots. I have thought that our Society does not offer that inducement for competition in this department that it should. If our farmers would take to the Exhibition more samples of their products, without thinking that they must be the very best, so as to take the *premium*, as though this was the sole object—but would rather present them to increase the interest of the exhibition, and to give a greater variety, to aid in forming an opinion as to the best variety for a certain location. The exhibition of butter and cheese was good. The display of apples, pears and grapes, was creditable. The importance of fruit raising does not appear to be sufficiently appreciated. We do not give that care and attention to the nursery and orchard that our interest demands. The display of vegetables, agricultural implements, domestic manufactures, needle work, etc., was good and interesting.

The crop of hay was generally rather light, though of good quality. Corn, about an average crop. Wheat has not been so good for many years. Potatoes, a fair crop. Oats, fair. Hops are raised to considerable extent in this section, but the crop was very light this year, in consequence of being badly winter killed last winter, and also from the effects of lice.

Amount of premiums offered, \$182; amount of premiums awarded, \$124.

WM. K. GREEN, *Secretary.*

PISCATAQUIS AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Piscataquis Agricultural Society held its Annual Exhibition at the trotting park in Foxcroft, Oct. 3d and 4th. It was the most successful exhibition ever held by this Society. One hundred and fifty new members were added to the Society. There was a large amount of neat stock on exhibition, especially oxen and steers; and a finer lot of large, well-formed cattle are seldom seen together. This is due, in a great measure, to the Short-horn bull, brought into the county by William Downs, of Dover. Although a grade claiming to be three-fourths Durham, one-fourth Hereford, his stock is almost faultless. He was sent to the shambles some two years ago, and we presume his stock will soon be extinct, as but few heifers were raised from him, and most of those shared the same fate before two years old. We seldom see bulls at our cattle fairs over three years old; so that by the time one is known as a good stock-getter he has been destroyed. It would be well to offer large premiums for bulls four years old and over, as it is generally acknowledged by breeders, that stock from mature animals is much better.

There was a good exhibition of horses, and especially of colts; showing that there is a marked improvement going on in the rearing of this noble animal. Farm stocks were well represented, and show that progress is being made in the right direction. Crops of all kinds are unusually good. Of hay we have full an average, although grass was badly winter-killed. Frequent showers in the spring and copious rains later in the season, caused resuscitation that gave us a bountiful crop of very fine, good hay, when not damaged by the weather. Although some of it was very late cut, it was of fine quality; most of it remaining green until the last of August. Wheat has done very well. There was but one entry for premium, that for 27 bushels per acre, which we think is not much above the average crop for the last four years would warrant; especially when we take into consideration its superiority as a crop to seed grass with. Other crops of grain are a full average.

Potatoes, which are our leading crop for feeding purposes, have yielded largely. Premiums were awarded for 382, 374, 251 bushels per acre, all of the Orono variety. Corn, premium crops were 91, 79, 59½ bushels of ears per half acre. There is an improvement in all the branches of farming. Farmers are beginning to think, and read. The consequence is, better management of stock, better tillage, and more permanent improvement. Much of this waking up is due to agricultural societies.

Amount of premiums offered, \$236; amount of premiums awarded, \$116.

PHINEAS M. JEFFERDS, *Secretary.*

NORTH PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

This Society, consisting at this time, of 290 members, held its fifteenth Annual Exhibition at Lincoln Village, October 3d and 4th. The attendance was large, and more than usual interest was manifested.

The entries of horned cattle, were 103 in number; of horses, mares and colts, 68.

A new and interesting feature was the presentation of entire herds of cattle.

Among the horses, beside other choice animals, was the celebrated Knox colt, owned by John A. Eames, of Passadumkeag, which took the first premium. There was also a good show of sheep and swine.

At the Hall was a very credible exhibition of domestic manufactures, dairy products, fruits and fancy articles, and more extensive than usual.

Among the premium crops were wheat by J. C. Emerson of Lincoln, 33½ bushels per acre; also 24 bushels by Samuel Hall of Lincoln.

Barley, 50 bushels per acre, by Mr. Hall, and 45 bushels by Mr. Emerson.

Potatoes, 288 bushels on one acre, by Horace Brown of Carroll, Oats, 56 bushels per acre, by George W. Thayer of Chester.

Indian corn, 80 bushels ears on half an acre, by Shepard Bean of Lee; 71½ bushels ears by William R Hersey of Lincoln.

To A. J. Heald was awarded a premium for largest product on one farm (excepting hay), being for corn, wheat, barley, oats and peas, beans, potatoes and pumpkins, grown on twelve acres, and estimated by the Committee to be worth \$840.50.

The hay crop was very heavy, although much reduced in value by continued rains during nearly all haying time.

Indian corn was good on dry soil, but on land naturally wet almost a failure.

Potatoes, great growth of tops, but being struck with the rust did not mature as last year. Reduced by rot from ten to fifty per cent. Quality bad.

Wheat, a better crop than for several years past, some raising as high as forty bushels per acre. Benjamin Whittier of Lee raised twenty-two bushels from one-half acre.

Oats, a great yield, and heavy.

Barley, very good.

Buckwheat, not much raised.

Beans, a fine crop, though somewhat injured by rust. C. House & Son of Lee have raised the present season over one hundred bushels good ones, worth from \$2.75 to \$3.25 per bushel.

Improvements.—During the two past years six or eight mowing machines have been introduced within the limits of our Society, and successfully used; others are preparing their farms for their use. In fact our farmers generally, those who are worthy the appellation, are availing themselves of the improved implements of husbandry.

Comparing the present with the past few years, a manifest improvement is noticeable in every department of agriculture. All kinds of stock, especially sheep, are very much in advance of the past; and every man who makes farming his entire business has no reason to be discouraged.

In our midst are three tanneries—Webb & Co. of Lowell, Burland of Lincoln, and Messrs. Kingman & Co. of Winn, or Five Islands, as it was formerly called. All of them are in successful operation, and doing a paying business. The one at Winn is larger than any other on the Penobscot. About three years ago the first blow was struck for its erection, and two years have now elapsed since it commenced running—consuming from twenty-five

to thirty cords of bark per day, and giving employment to some three hundred men.

Amount of premiums offered, \$365; amount of premiums awarded, \$202.

SHEPARD BEAN, *Secretary.*

WEST PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

This Society held its Twelfth Annual Cattle Show, Exhibition and Fair, at East Corinth, September 25th and 26th, 1866. The weather was unfavorable—a rain storm set in early on the first day and continued at intervals through both days, damping very much the out-door department.

The show of stock was, however, very good. Oxen and steers in particular were extra; and the trials of strength and discipline by oxen and horses were superior to any former exhibition.

The Show in the Hall was very attractive—more so perhaps on account of the rain and mud outside. The fruit department was excellent; the specimens of crops very good. Large entry of butter and cheese of superior quality, and a fair display of preserves, jellies, etc., were on the tables.

Of domestic manufactures, needlework, paintings, fancy articles, etc., the Committee remark: "The display of articles in this department was not so full as in former exhibitions. The unpleasant state of the weather was no doubt the principal cause. It was gratifying, however, notwithstanding all the impediments that presented themselves, to witness the many evidences that industry, economy and taste were something more than mere names amongst the fairer portion of our race. It was pleasing and flattering too to witness the various ways in which these virtues were combined in order to contribute to the welfare and comfort of man. The firm, thick, fullered clothes, the soft flannels, the nice double mittens and hose, and woollen blankets, all to protect us from the cold during the rigorous winter. The beautiful hearth-rugs and patchwork quilts were tangible proofs that economy, that handmaid of prosperity, was consulted in these contributions

to our welfare, and that while our comfort was enhanced, our pockets were not depleted. The specimens of needle-work and the crocheting demonstrated that not only industry and economy but even taste had been brought into requisition to add to our welfare and comfort."

The crop department opened with a large entry, but many failed to appear with the necessary statement. N. H. Shaw of Exeter, produced from one acre $31\frac{1}{2}$ bushels wheat; from another acre $87\frac{1}{2}$ bushels corn; from another acre 51 bushels oats and peas, and from another acre 262 bushels potatoes. E. F. Crane of Kenduskeag produced from one acre 27 bushels wheat; from another acre $90\frac{1}{2}$ bushels corn; from another acre 39 bushels barley, and from another acre 330 bushels potatoes. E. B. Stackpole of Kenduskeag produced from one acre 21 bushels wheat; from another acre 27 bushels buckwheat; from half an acre 112 bushels potatoes; from one-fourth acre $7\frac{1}{2}$ bushels beans, and from one-eighth an acre 60 bushels carrots. B. Baston of Levant produced from one acre 51 bushels barley. W. E. Atwood of Kenduskeag produced 501 bushels ruta bagas from five-eighths of an acre. Jacob Eastman of Exeter produced from one acre 62 bushels corn; from another acre 248 bushels potatoes, and from half an acre 136 bushels potatoes. Mrs. A. Blake of Corinth produced 79 bushels corn from 156 square rods.

Seventeen new members were added, and we judge from indications considered unmistakable, that had we been favored with good weather our Show would have surpassed any other held in this place.

Amount of premiums offered, \$644; amount of premiums awarded, \$261.

T. P. BATCHELDER, *Secretary*.

PENOBSCOT AND AROOSTOOK UNION AGRICULTURAL AND HORTICULTURAL SOCIETY.

SECRETARY'S REPORT.

After a suspension of three years, our Fair this year was a success. It was held on the 11th of October at Patten. The day was pleasant, and the collection of people, farmers and others, was large. It was emphatically a farmer's holiday.

At 11 o'clock A. M. the Society assembled at the academy and listened to a practical address by the the Rev. E. Fobes of Patten, after which the Society again assembled in the Academy Hall and partook of a farmer's dinner, furnished and prepared by the ladies of the Sidewalk Society of Patten Village. After the dinner was disposed of, the awarding committees attended to their duties.

The collection of horses and cattle was not so large as in some past years, but those exhibited were better than usual, showing the fact that our Society has paid attention to the improvement of stock.

Several valuable horses were on exhibition, among which was a stallion two years old, owned by Mr. Edward Jackman of Sherman. Mr. J. S. Hall of Patten and Mr. Rand of Sherman exhibited colts that were valuable animals. There were other good colts, 27 in all.

Mr. J. S. Hall, Mr. Stimson, and Mr. Joy of Patten exhibited each a pair of working oxen that were large and valuable animals.

Mr. Phelps of Mt. Chase exhibited a large and valuable stock cow and two good heifers.

There were many other valuable animals on the ground that deserve favorable notice.

The cattle were mostly of the Durham grade with a cross of the Devon.

Although there are many good flocks of sheep within the limits of this Society, only one was on the ground, and that was owned by Mr. Thomas Myrick of Mt. Chase.

This country is well adapted to wool growing. Sheep do well and pay well. Wool and lambs sell for cash at our doors.

Mr. James S. Mitchell of Patten keeps on his farm 100 sheep;

his income from wool and lambs amounted this year to about \$500 in cash. Many other farmers with smaller flocks of sheep have found them equally profitable.

In the ladies department were many articles of home manufacture, which were good and valuable, such as all wool cloth, cotton and wool cloth, blankets, flannel, drawers, mittens, yarn, quilts, carpets, rugs, stockings, and fancy articles.

Many varieties of apples were on exhibition, grafted and native apples. A. Cushman, Esq., of Sherman, H. N. Darling of Patten, C. O. Brown of No. 6, were the principal exhibitors of fruit.

I have said nothing about hogs, but this is not a subject of small importance, when pork is worth \$50 per barrel. Some of our farmers make pork raising a profitable business. Mr. S. Wiggin of Patten slaughters every year hogs that weigh 500 to 700 pounds each, which at 16 to 18 cents per pound amounts to quite a pile of cash.

Oat raising is another item of farming which does well. Mr. J. B. Leslie & Bro. raised this year, on their farm, on the plow, 900 bushels of oats, which sell at 75 cents per bushel—\$675.

Why should our young men go west to make farms, when cheap lands and good lands and good crops and good markets can be found in our own State?

All business is based on cash. Show our young farmers how they can raise the dollars and cents on their farms and there will be no want of energy; they will cut down the trees and turn up the sod, and farming will go ahead. Farmer's colleges and farming improvements and improved stock, are all well enough, but the main question after all is, how shall we get the dollars, how shall we pay our bills?

Amount of premiums offered, \$150; amount of premiums awarded, \$95.

LUTHER ROGERS, *Secretary*.

The following notes are furnished by Mr. A. Cushman:

The past season has been favorable for crops of all kinds. The frequent rains produced an abundant crop of grass, but much of it was damaged in harvesting, the haying season being wetter than was ever known here before. Intervales were overflowed most of the time during the season for cutting grass, and most of them remain uncut.

Wheat has been invariably good. The two prevailing scourges of wheat have been unknown the past season. Neither rust nor midge have done any damage the two past summers. Its cultivation is on the increase.

Corn has produced an abundant harvest for all who planted and treated it properly, as the entries at our Society will show. More should be planted.

Oats have produced abundantly, and the grain is unusually heavy, often weighing 37 or 38 pounds per bushel. They are now worth 75 or 80 cents per bushel.

Barley has done hardly as well as usual, not producing the usual number of bushels, yet the grain is good. It is not extensively cultivated.

Buckwheat as usual is good. It yields well on poor land, and farmers depend upon it mainly for making their pork. It is generally quite a valuable crop, easily harvested, and leaves the ground more light and less impoverished than any other crop.

Rye whenever sown returns a fair compensation for labor, but there is but little sown.

Peas as a field crop are but little cultivated, but will do better on poor, worn out land than any other grain, and leave the land in good condition.

Beans have been more damaged than any other crop the past season, being rusted by the excess of wet weather, though in some cases the yield was very good.

Potatoes have resulted much better than was expected. The exceedingly wet weather rusted the tops, and it was feared the rot would destroy the roots; and in some instances it did make its appearance, but has done very little injury. The crop was good and the quality fair.

The past season has been very poor for fruit, by reason of a small worm which made its appearance in the blossom buds before they were in bloom, destroying from a few on a tree in one case, to the whole in another. Late last fall small, light-colored millers were flying around the trees, and probably deposited the eggs in the blossom buds, from which the worm above referred to proceeded. The forest was filled in this vicinity with an innumerable number of those millers, one and two years ago, and the result was, the June following the trees were covered with worms, who devoured the leaves, and made the trees almost as leafless as in

January. Those on the apple trees were the same. If they stood near the forest they were injured more, if further off they suffered less. My orchard would have probably produced four or five hundred bushels of apples if the worms had let it alone, as it was I got one hundred. Apple trees look healthy and vigorous.

NORTH WALDO AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Fifth Annual Show and Fair of the North Waldo Agricultural Society was held at Stevens' Trotting Park in Unity, October 9th and 10th, 1866. The weather was very fine. The number of entries as large as usual. The show of neat stock, horses and sheep was good, and they were all in good condition, the fall feed never having been better in our locality. The Show at the Hall was excellent. A good display of fruit, and the report of farmers is of large crops of corn. Wheat and potatoes were better than usual. Some of our farmers report their wheat at from thirty to forty bushels per acre. Potatoes from three to four hundred bushels per acre.

Amount of premiums offered, \$285; amount of premiums awarded, \$262.

ELI VICKERY, *Secretary.*

WALDO COUNTY AGRICULTURAL SOCIETY.

REPORT OF SECRETARY.

The Annual Show and Fair of this Society was held October 17th, 18th and 19th. The weather was fine and the attendance unusually large. The entries of stock were 137. At the Hall 193 entries were made, being a larger number than in previous years.

The character of the cattle exhibited was highly creditable, embracing Devons, Herefords, Durham and Ayrshire. The show of sheep was not what it ought to have been; and few swine were shown. Colts were very good. Fine specimens of farm, carriage and work horses were present.

The fruit show was good, but not up to last year. Roots and garden vegetables were shown in profusion and excellence; also fine samples of grain, oats, peas, beans, barley, wheat and Indian corn.

The Fair closed on the 20th, having proved one of the most successful ever held by the Society. The weather was fine throughout, the attendance much larger than ever before, and the receipts over a thousand dollars.

Amount offered in premiums, \$705; amount of premiums awarded, \$631.

T. THORNDIKE, *Secretary.*

SAGADAHOC AGRICULTURAL AND HORTICULTURAL
SOCIETY.

REPORT OF THE SECRETARY.

The Twelfth Annual Fair and Cattle Show of this Society was held upon the grounds of the Society, Topsham, October 9th, 10th and 11th, 1866. Tuesday, as usual, was devoted to the exhibition and examination of cattle, sheep, swine and poultry, also ploughing, all of which passed off satisfactorily, except the show of cattle, which was unusually small, not equal to any of our former exhibitions. We noticed many good pairs of oxen, and some fine cows and good young stock, by the most enterprising of our farmers, chiefly from the immediate neighborhood of the grounds. Of sheep we had a good show, much better than usual. Prominent among them was the South Down, the preferable breed in our locality for wool and mutton combined. Many coops of turkeys, geese and fowls, proving by the specimens presented that the raisers are alive to improvements.

We have within the bounds of our Society excellent specimens of oxen, and in large numbers, also as fine cows as are to be found elsewhere, although not so numerous, and we hope to be able to say that our next exhibition of live stock is the largest and best ever seen upon the grounds, and no earthly reason can be given why it should not be so.

Wednesday was the day for exhibition of horses; and this part of the exhibition showed that there was a good improvement from former shows. Unusual inducements were offered exhibitors of trotting horses, which brought out many of the fast nags from other parts of the state, and also a large gathering of people to witness the same. The track was in good condition. As fast time never was made upon the grounds before. We have now within the limits of this Society, owned by Messrs. J. & S. Sampson of Bowdoinham, a promising Knox stallion, an imported English and French stallion, owned by A. S. Perkins of Topsham, and a Young Flying Eaton stallion, owned by J. H. Alexander of Topsham. Our people are awake to improvement of horses, not only to horses for all work but also for speed.

The Society building was opened to-day to exhibitors, and here was seen a fine display of field crops, especially of corn, pumpkins and squashes, which was very fine; root crops in good variety, bountiful in quantity and monstrous in size; apples in large quantities and in great variety; pears scarce, but many good specimens; grapes of many kinds, chiefly raised in open air, and well ripened. And last but not least, the ladies of the Society displayed very extra specimens of household made fabrics of cotton and woollen goods, together with fine samples of needlework, products of their own hands during the past year, giving evidence that industrious and skilful habits have been steadily pursued by the few exhibitors, and ought to be by the many to their profit.

Thursday was spent in hearing reports from the awarding committees, and by short addresses from several gentlemen, that were listened to with eager attention, especially the addresses, which seemed to us as words fitly spoken; after which the ladies and gentlemen's equestrian exercises took place, closing the exhibition, with fine weather the whole time, with much larger attendance than usual, and consequently the gratifying result of much larger receipts, assisting us in reducing our Society's debt. We hope soon to be able to say that we are out of debt and are using receipts to improvement of agriculture and the arts by offering large premiums, and inducing more competition among farmers and mechanics.

We feel largely indebted to those who year after year make it a point to do something for the exhibition; but we have a large and fine building and it requires the labor of many to get up a good show. But many of our farmers are finding out that no better way for advertising any article they have to sell can be found than by exhibiting such articles at our Fair. And we have yet to find the mechanic or artist or merchant who will say that he has not received a great advantage by contributing to our exhibition commensurate with the efforts made. In conclusion, my conviction is that the influences of the Society are widely felt for good, and the interest in the exhibition by the public increase.

Amount of premiums offered, \$573; amount of premiums awarded, \$482.

ISAAC P. TEBBETTS, *Secretary*.

FRANKLIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Twenty-sixth Annual Show and Fair of the Franklin County Agricultural Society was held at their grounds in Farmington the 2d, 3d and 4th of October, 1866.

The weather was good on the opening day of the Show, and the exhibition of stock was better perhaps than ever before, plainly showing the influence of the Society upon our farmers, even upon those who are not members. Here were oxen girting eight feet, when at the formation of our Society seven feet was considered all our stock growers could hope for. This department was pronounced by good judges a decided success.

The Fair at the Hall opened on Wednesday, also the exhibition of horses. Although the weather was not what could be wished, the attendance was large and the exhibition good.

On Thursday, the last day, the weather was cold and windy, yet the number of people present was never larger, who listened to an excellent address by Dr. N. T. True, giving many valuable hints to all, especially to the farmer and mechanic:

The specimens of butter and cheese were excellent. The exhibition of fruit was large; we think the most ever on exhibition at our Hall. Maj. Loren Adams and others presented fine lots of grapes. Maj. S. Dill of Phillips was on hand with his cranberrys, for which he receives our thanks.

The exhibition of domestic manufactures and fancy articles was good, especially those of the useful, including all wool cloth, cotton and wool flannels, diaper, rugs and mats, &c. The opinion generally pervades that our Fair and Show passed off satisfactorily, and in all of its departments was a success.

Amount of premiums offered, \$339; amount of premiums awarded, \$250.

PETER P. TUFTS, *Secretary.*

NORTH FRANKLIN AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition, Show and Fair was held at Phillips, on Wednesday and Thursday, October 10th and 11th, 1866.

This Society now consists of about two hundred members. Its financial circumstances are steadily improving, and its influence for good increases every year.

Wednesday, the first day of the Exhibition, was assigned for show of horses, cattle, sheep and swine. The number of entries was larger than for several years. Neat stock continues to be a prominent feature of the Exhibition. The number of oxen entered was large. The prize for town team of oxen was awarded to Phillips. Stock and milch cows, bulls, steers and heifers were well represented.

Mr. Joshua Taft of Weld, entered one pair of yearling steers girting 6 feet, well matched and proportioned. The prize for town team of three years old steers was awarded to the town of Phillips; average girth 6 feet 4 inches. The second premium was awarded to the town of Avon; average girth 6 feet 2½ inches. The bulls exhibited were Grade-Durham, Devon and Hereford.

In the horse department twenty-five entries were made, and the specimens on exhibition fully justify the farmers of North Franklin in the pride which they display in exhibiting these animals.

The sheep department was poorly represented. This, by no means, is owing to a scarcity of sheep or lack of interest in this department; on the contrary, the interest in wool-growing was never greater than now, as the numbers of sheep and quality of the wool will amply testify.

In the crop department considerable interest was manifested in making entries, but at the meeting of the adjudging committee in December many failed to present statements and specimens. Mr. Mark G. Walker of Phillips, produced from one acre 144 bushels of ears of corn. Mr. James W. Butterfield of Phillips, produced from one-half acre 76 bushels. Mr. D. L. Harlow of Avon, raised from three and one-half acres 196 bushels well cleansed grain, 46½ bushels oats and peas, 149½ bushels clear oats; he also raised from

one-half acre 190 bushels potatoes. Mr. Harrison Beal of Avon, raised from one-half acre 177½ bushels potatoes. Mr. H. M. Butterfield of Phillips, produced from one-half acre 175 bushels.

There is quite an interest now felt among the farmers in this section in wheat-raising, those having tried the experiment being rewarded with bountiful crops, some raising as many as two hundred bushels.

The exhibition of fruit and vegetables was rather meagre; Maj. S. Dill, however, displayed a very palate-tempting variety of apples, grapes and cranberries.

Second Day. Address by E. D. Nash, Esq., of Phillips. Mr. N.'s address was an able and interesting production adapted to the occasion and wants of the Society.

The display of domestic manufactures, needlework, paintings, &c., was praiseworthy and did much credit to the ladies who support this department.

In conclusion we would remark that there is in this section a growing desire among both farmers and mechanics to be masters of their professions. This Society, we believe, in the fifteen years of its existence, has done much to the attainment of this end. Agriculture is the parent of all other arts; from it they derive their sustenance, their support, and as the parent, there are none but should do it homage. One of its chief supports are our Agricultural Societies, and as such are deserving of aid from every hand.

T. A. JOSELYN, *Secretary.*

EAST SOMERSET AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The East Somerset Agricultural Society held its Annual Exhibition in Hartland on the 11th and 12th of September, 1866.

The show of neat stock was not as large as in some preceding years, but was of very good quality. James Fuller of Hartland, exhibited full-blood Hereford and Jersey bulls. C. B. Stinchfield of St. Albans, had on exhibition a Jersey cow and heifer, which were good specimens of that breed. There were some very good oxen and steers of the Hereford breed.

The show of horses was larger than of any former year and of a better quality. There were some fine colts of the Drew breed.

The show of sheep and swine was small. Clement Goodwin of Hartland, had a fine flock of Spanish Merinos.

The exhibition of manufactured articles and dairy products was small, owing to the day being rainy.

The show of fruit and vegetables was not as large as some former years, the Show being too early in the season.

Amount of premiums offered, \$278; amount of premiums awarded, \$217.

THOMAS FULLER, *Secretary.*

WEST SOMERSET AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition of this Society was held on the Fair Ground, near Anson village on the 10th and 11th of October, 1866. The weather was fine and the attendance both days very large. Many noted farmers from distant parts of the State were present, and all conceded that the show of stock and sheep excelled any show ever held in Maine. The Maine Farmer was right when it predicted (beforehand) the best sheep show that could be got up in Maine.

There were on exhibition two hundred and eighty head of horned cattle, three hundred and fifty sheep, including bucks and lambs, thirty-five horses and colts, and some swine. The neat stock was mostly Durham, with a sprinkling of Herefords, Devons and Jerseys. The Durhams are the favorites of the farmers, who breed mostly for working oxen, and among whom can be found the best oxen in the State. The sheep are of the fine wool variety, nearly all Spanish Merino. The predominating breed of horses is not easy to determine; the finest animals, however, are of the Knox or Drew blood.

Liberal premiums were offered on field crops, but, though the crops have been generally good hereabouts, there were but two entries made,—one each on corn and wheat, the statements of which are forwarded herewith. For several years back our farmers have generally abandoned the cultivation of wheat; but the experience of the last two or three years shows very good results from what has been sowed, and another year we think will show a large increase in this direction. Wheat has been good in this locality this year; all other grain crops have been abundant, the corn of not quite so good quality as last year. Of potatoes there was a wide spread and an abundant crop.

The exhibition of dairy products, fruits and garden vegetables was unusually small, more attention being paid to raising fine animals than to making butter and cheese.

The department of household articles, domestic manufactures,

needle-work, fancy, &c., &c., was very well filled, showing an increased interest in the manufacture of domestic cloths, &c.

On the whole our Society has been very successful this year. We have succeeded in entirely liquidating the debt hanging over us and leaving a "shot in the locker" for further improvements.

Amount of premiums offered, \$282; amount of premiums awarded, \$254.

ALBERT MOORE, *Secretary.*

The corn was grown on green sward broke the fall before; the soil is rocky loam, had been mown five years; there was about five cords of barn manure applied to the hill, and had been thrown into the hog-yard the summer before. It was planted about the 20th of May; hoed twice. Before hoeing the first time I applied one handful to each hill of equal parts of lime, plaster and ashes. It was harvested about the first of October, and had one hundred and eighty-seven bushels of ears, weighing $37\frac{1}{2}$ lbs. to the bushel.

Cost.

Plowing ground,	\$3 00
Harrowing and applying manure,	3 00
Cultivating and hoeing twice,	4 00
Harvesting,	4 00
Cost of manure,	10 00
Total cost of crop,	\$24 00

Value.

Ninety-three and one-half bushels of corn,	\$140 00
Two loads of pumpkins,	3 00
One ton of fodder,	5 00
Manure left for future crops,	5 00
Total,	\$153 25
Deduct cost,	24 00
Profit,	\$129 25

T. F. BOOTHBY.

Embsden, Oct. 25, 1866.

The mode of raising my wheat was as follows: Broke up the ground in the fall of 1864—one acre and a third. In the spring of 1865 hauled on fifteen loads of manure from the heap and harrowed

it in, and dropped in the hill ten loads of old manure, and planted with corn. Harvested 109 bushels of ears of corn, and pumpkins and beans enough to pay for the labor.

On the first day of May, 1866, I plowed the ground, and on the fifth harrowed it and sowed the wheat, three bushels. On the 21st day of August I harvested, and November 3d threshed the wheat, amounting to 30½ bushels, equal to some over 20 bushels to the acre.

Cost.

Plowing,	\$3 50
Harrowing and sowing,	8 50
Seed,	9 00
Harvesting—two men one day,	4 00
Threshing,	2 50
Total,	\$22 50

Value.

Thirty and one-half bushels of wheat,	\$91 50
Three tons of straw,	15 00
Total,	\$106 50
Deduct cost,	22 50
Profit,	\$84 00

JOHN M. HURON.

SOMERSET CENTRAL AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Exhibition of the Society the past year compared favorably with those held in previous years. The number of oxen on exhibition was a third larger than the previous year, and were considered equal in quality. The number of horses was equal to any show which the Society has ever had. Cows, steers and calves were in attendance as usual, in about the same number and quality.

S. W. Coburn presented some fine specimens of thorough-bred Durhams; also A. B. Chandler a very fine blooded Durham bull and heifer from the herd of Mr. Percival of Vassalborough. Mr. John Wentworth exhibited also a thorough-bred Hereford bull.

There were some very good specimens of thorough-bred sheep of the Spanish, South Down and Cotswold varieties.

In the horse department we never have had but one or two stallions that had any claim to *good breeding*. While the most of farmers will readily acknowledge the necessity of blood in cattle and sheep in order to gain a given result, and are carrying their theory into practice in many cases; but in the breeding of horses a slipshod and hap-hazard course is pursued. Upon the whole I think there is more interest felt in regard to the breeding of various domestic animals than has heretofore existed.

The crops in 1866 as a whole were very good. Hay, our staple crop, an average. Potatoes, those planted by the 20th of May were good, and in favorable localities excellent crops were obtained, often 200 bushels per acre; but late planted fell short. Corn obtained a good growth, eared well and matured in fine condition. Wheat was good; from the inquiry which I have been able to make I think the crop averaged 15 bushels per acre and the quality, when well cleaned, equal to best flour in market.

The spring opened finely for the farmer and continued so until the crops were put in. The growing season commenced about the 25th of June and continued about four weeks, after this wet and rather cool prevailed until frost; in consequence late crops did not meet the hopes of the farmer.

Amount of premiums offered, \$483 ; amount of premiums awarded, \$336.

NORRIS MARSTON, *Secretary*.

WASHINGTON COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition was held at Pembroke September 26th and 27th. The weather was favorable the first day and the show of stock, vegetables and dairy products was good, both in quantity and quality. The second, devoted principally to the exhibition of horses and trial of their speed, was rainy, yet some 1500 people were present and a good degree of interest was maintained throughout.

The display of milch cows, working oxen and horses was an advance on former years, showing a steady improvement in *breed* as well as in numbers. There were several entries of sheep, large in size and with heavy fleeces of fine wool, of which the South Down is the predominating breed. A pair of swine for breeders, imported from Pennsylvania by M. L. Wilder, Esq., of Pembroke, were on exhibition and took the premium.

Corn and grain crops were meagre, occasioned by a wet, backward spring and the rust which attacked the latter. Rust and rot attacked the potato plant, yet full an average crop was harvested. The statement on which the first premium was awarded shows a crop of 284 bushels to the acre. The hay crop was light, not over two-thirds the usual quantity, and was generally much damaged in getting.

Amount of premiums offered, \$685 ; amount of premiums awarded, \$402.

E. K. SMART, *Secretary*.

WEST WASHINGTON AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Cattle Show and Fair of this Society was held at the Society's grounds in Jonesboro', October 3d and 4th. The weather was not so favorable as desired. The first day was cold and cheerless, but the second was somewhat warmer, yet uncomfortably cool. The attendance was larger than expected, considering the weather, but not so large as that of last year.

The show of cattle was better than at any other Fair of this Society. It was remarked by men at the Exhibition who were acquainted through the State, and well qualified to judge, that a better show of cattle would not be exhibited in the State during the season. The improvement in stock has been mainly effected through the introduction of the Durham bull presented to the Society by Mr. Black, and the enterprise of some few individuals in the Society securing blood animals. There were some very fine bulls on exhibition of the Durham and Ayrshire breeds.

The show of horses was not, perhaps, quite up to that of last year, but very fair. There did not appear to be that interest in showing off the merits of this noble animal, either as regards speed or family uses, as at former shows; but a deep interest was taken in exhibiting the strength and power of the horse and ox in drawing, which was quite an attractive feature of the Show.

The sheep shown at the Fair this season were fine specimens, and the number greater than that of last year. The interest in the improvement and management of sheep seems to be unabated.

There was a very good show of swine this year; the number was not large but the samples good, mainly of the Chester and Suffolk breeds, with some others.

The show of dairy products was rather limited, although the season has been quite favorable to that branch of husbandry. The prices of butter and cheese are ruling high,—butter from 30 cents to 45 cents per pound, cheese from 18 cents to 25 cents per pound.

The stock of cattle in this section, as a general thing, is very much below the requirements of the inhabitants, rendering the prices of all kinds of stock very high.

The grass crop was very light this season, and owing to unfavorable weather was more or less damaged in curing. Very little hay of the first quality was harvested. The long continuance of wet weather through the entire haying season so overflowed many of the low meadows and intervals as to render the grass growing upon them entirely worthless for hay, and by that means so diminishing the quantity of forage that many farmers hereabouts will scarcely have enough to carry them through the winter, although the fall has been very favorable to the production of later feed, thereby rendering the quantity of hay necessary considerably less than ordinarily.

The potato crop was remarkably large this fall, yet considerably affected by the "rot," many losing large quantities after they were cellared.

I have thought, and am still of the opinion, that agricultural societies, in this part of the State especially, do not give sufficient encouragement in the way of premiums, to the production of crops of grain, such as corn, oats, barley, &c. These crops can be raised, at present prices, with a profit to the farmer, and were they grown in considerable quantities would go a great way towards retaining a large amount of cash in the State, that now goes to the west to pay for corn used by lumbermen and others to feed to teams.

This Society, under present management, is having a very beneficial effect on the agricultural interest of this section.

Amount of premiums offered, \$664; amount of premiums awarded, \$460.

JAMES L. BUCKNAM, *Secretary.*

SELECTED PAPERS.

POWER, FORCE AND MATTER:

THEIR DIVERSITY, UNITY, SIMPLICITY AND HARMONY, THE BASIS OF
ALL SCIENCE AND ALL KNOWLEDGE.

BY PROF. J. B. TURNER.

[From the Transactions of the Illinois Agricultural Society.]

It is well on all subjects, sometimes to recur to fundamental principles and consider to what final results these would carry us, if unsparingly applied to all objects of research or of thought. Especially is this appropriate in our investigations of the Laws of Nature; for, by this method alone, can we know whether our assumed principles are true or false, and what we are to expect in their future application to phenomena still unknown, or but imperfectly apprehended and classified under these general axioms or truths.

The most rigorous application of our assumed axioms to unknown as well as known phenomena, although in one aspect it may be simply theorizing, inasmuch as it may indicate a probable theory of these phenomena, in another aspect it is only a proper testing of the truth or falsehood of these axioms themselves. In either view, however inappropriate it may seem to the mere pedantic smatterer in science, it cannot be uninteresting to the true philosopher. I have thought, therefore, that it would neither be improper nor unacceptable, on the present occasion, to call the attention of this association to the probable ULTIMATE AND UTTER SIMPLICITY OF NATURE, OF THE WHOLE UNIVERSE OF GOD, as a necessary logical consequence of the fundamental axioms of the Baconian Philosophy.

None can be more fully aware of the difficulty of presenting such a subject, than the members of this association; and none can lament my incompetency to the task more deeply than myself; but

with that indulgence which confessed ignorance may always claim from the truly wise, I will endeavor to present an outline both of my thoughts and of my doubts in a somewhat intelligible form; with less regard to the technical terms and theories of extant science, or the demands of either precision of thought or elegance of style, than to the present necessities of a miscellaneous audience.

What then is the *ultimate axiom* of the Baconian or Modern Philosophy? It is the assumption of the absolute simplicity of the law of causation—or the doctrine that all effects are produced by simple and not by a complex causation.

This doctrine is based on the observation of the entire simplicity of causation, so far as our knowledge has as yet extended, or the extreme unity and simplicity of those causes which, at all points, are found to underlie and produce the boundless phenomenal variety of the Creator's works. And the *philosophic rule*, derived from this, is, never to assume but one cause where that is adequate to the result.

Is this fundamental doctrine and its resultant rule, correct? and, if so, SHALL we, DARE we, apply it to all known being and phenomena? But, if not so applicable, it is not, of course, correct, and should be at once abandoned, as untenable; or, at least, should be so far limited and explained, as to indicate, truly, precisely how much we do mean, and what we do not mean, by it. And even if this discourse should have no other use it may provoke thought and incite a more careful scrutiny on this point.

It is self-evident that we know but three generic forms of existence or of being in the Universe of God. To designate these by the old and more common terminology, we should call the first or lowest in the order, **MATTER**; the second, the **IMPONDERABLE AGENTS**, such as light, heat, electricity, etc.; and third, the **VOLUNTARY AGENTS**, such as men, animals, beasts, birds, etc. The perceived peculiarity of the first, or of **MATTER** is, **FORM** and its **ATTENDANTS**; that of the second, is simple **FORCE**, capacity of producing motion, or tendency toward motion; and its attendants; that of the third class, is **POWER** of thought and of will, in higher or lower degrees; or, **POWER** of will and its attendants and results; or, perhaps, better, **SIMPLE SELF-MOVING POWER**. By a shorter terminology, then, I will name these three generic forms of all known being:

MATTER, producing form, and its attendants;

FORCE, producing motion, and its attendants; and

POWER, producing thought and will, and their attendants and results.

I might then, perhaps, here say, that simple MATTER, FORCE and MIND, include all known things; except that it would be straining the usual signification of *mind*, to make it embrace all those lower orders of being, which seem to have some power of thought or of will; and it is not clear, to say the least, that any form of voluntary being, belongs to, or results from, mere MATTER and FORCE; though it may be so. For, though this voluntary principle, or POWER, of will or of thought, seems to exist in three distinct forms:—in connection with reason and conscience, as in the case of moral beings; in connection with intelligence or thought, in greater or less degrees, as in the higher orders of animal life; and, in connection with bare instinct, in still lower orders—we still know nothing about it, except that it is a mere POWER, of some sort, manifesting volition of thought and will—just as FORCE is known only as the cause producing motion. But, on the other hand, we can scarce resist the impression, that matter must consist of atoms or elements, though actually known only as the cause of *form* and its attendants. And thus matter, stripped of its phenomenal adjunct of form, presents itself to us as simple ATOMS; and then we have in the world, only ATOMS, FORCES and POWERS—the one producing, (or, perhaps better, merely presenting or resulting in,) all FORM; the next, producing all motion and change of place or form; and the last producing all thought and will—the great Trinity of Universal Science and Nature—the first, the proximate cause of all form; the second, the proximate cause of all motion or change; and the third, the proximate cause of all thought and all will; and in its highest manifestations, the great first cause of, or rather power, producing, all things—all motion—all change—all matter—all everything. The first two of these, matter and force, belong to the realm of the properly natural, or the realm of natural and necessary causation; the last, or POWER of will belongs to the realm or sphere of the supernatural, and lies, at least so far as we know or can see, wholly outside of the realm of necessary causation, and within the realm of voluntary self-determining, self-controlling power—existing, as indeed as do, also, matter and force, under an infinite variety of phenomenal aspects; or rather, working with infinitely diversified degrees and aspects of power; but ever, still as an original, spontaneous and independent fountain or source of POWER, however small or large; and holding within itself,

in its own inherent nature, the cause of its own action; and not, like matter and force, moving only as it is acted upon by some cause from without. But as matter, force, and power or mind, must all alike have an appropriate sphere of action, so also, in each alike, this sphere of action is not the cause of their action. For example:—as matter must have space, as its sphere of action, or it cannot exhibit its phenomena of form; and as force must have matter to act upon, as its sphere or occasion of action, or it cannot produce its phenomena of motion, or of tendency toward motion—so this *power*, this ORIGINAL SELF-DETERMINING and SELF-CONTROLLING POWER of will, or mind, must have its proper sphere or occasion of action, or MATTER to act upon and FORCE to act with, or something to choose and to do, or it cannot exhibit its peculiar phenomenal power. But space is not the cause of power, nor is matter the cause of force, nor are all together the cause of volition or of the action of this POWER of will or mind, but only the instruments or the occasions which render such action possible.

And precisely here, I pause to make my lowest bow to good old Jonathan Edwards and his erudite disciples, and bid them God speed. For it is self-evident that neither matter nor force of any sort, or in any form has any more tendency or even appetency to control mind, or will or POWER, in the true sense of the terms, than space has to control form, or inert matter to control force. And the only answer to the question “what causes this mind, this POWER, to act so and so?” which we can give, is simply this: “God made it, not a form, or a force, but a POWER, in its own nature and sphere capable of such action—just as he made force capable of its own natural action upon matter, and matter capable of assuming form in space.” In other words, the natural only, or MATTER and FORCE, are governed by laws of causation; but the supernatural, or mind, will, real POWER, is governed only by the laws of volition or the laws of the SUPERNATURAL—which are neither laws of form or of force or of causation, in any such sense as is ever implied in the realm of the natural.

If now we look over the world of sense, we shall find all its infinitely varied and wondrous phenomena, *at any given moment*, to consist simply of matter, in its various forms and its attendant colors—though color probably belongs to the order of force rather than of matter—and whatever *change*, either of form, or of size, or place, occurs in these atoms of matter—whether from without or from within—whether of growth or of decay—is the result of some

FORCE, astronomical, mechanical or chemical, producing or tending toward motion ; and these can no more be changed, without force, producing motion, than there can be power without matter. The question then here arises—are these two all-producing, all-embracing elements of all being, and all change in the physical world, simple or complex ?—each a unit, in itself, or multiform and varied ? It is not enough to say that the books give us a great many kinds of matter, and a great variety of forces ; for the question is—how do the books know ? and on what authority do the books contradict the very axioms, on the basis of which they themselves are professedly written ? Is their doctrine of the simplicity of nature, and of causes, to be retained or abandoned ? That is the question. If it is to be rigorously retained, then we come, at once, to a view of the utter unity and simplicity of nature, that is most sublime and astounding, and still just what he who knows how simple gravity wheels all suns and spheres and atoms should be prepared to expect—and certainly many of our best writers and thinkers admit the possibility, if not the certainty, of this entire simplicity of matter.

It is generally conceded, then, that matter consists of atoms, or, as they are sometimes called, elements ; and it is also quite generally supposed that we know of more than one elemental, or ultimate, or atomic, form of matter. But do we know this ? or only assume it, without any ground of confidence, and strictly against all our axioms and analogies, derived from other sources ? Some have supposed that at least two ultimate or atomic forms of matter must exist, or else there could be no combination and no change, producing all the varied phenomena of the material world. But suppose that the ultimate atoms of matter are all one and the same—all, if you please, perfectly regular in their shape, like the eggs of the same bird or fowl or insect ; still it is susceptible of mathematical demonstration that the forms into which these ultimate atoms may be piled or congregated, by simply varying the angles of their axis, or their relative distances apart, or both, is absolutely infinite : Thus—take the above mentioned form of matter, which we can most easily conceive of, as an illustration—the egg of a fowl. All can perceive that by varying the angles of their incidence, and their relative distances from each other, the forms in which they may be piled or congregated are absolutely infinite, producing as many forms of piles as there can be forms of matter in the universe of God—however many there may be. I shall soon

Until very recently, a confident expectation has been entertained of being able to present here a report of the progress of the State College of Agriculture and the Mechanic Arts from the pen of the President of the Board of its Trustees.

Although circumstances prevent its completion in time to appear in these pages, such a report may yet be expected during the early part of the session of the Legislature, and such being the case, there appears an obvious impropriety in any attempt on my part to anticipate its statements, views and recommendations.

No one who has followed the very able writer of the next preceding article in his presentation of the subject, can fail to perceive in some good degree, the novelty, the magnitude and the difficulty of the problem, the working out of which is put in charge of this Board of Trustees. To those who are impatient of delay, and desire speedy results, we respectfully suggest that the class of institutions called into existence by the act of Congress is wholly unique, that there are no precedents by which to be instructed, and that great danger exists of falling into errors more or less injurious; consequently it is the part of wisdom to exercise great caution and deliberation in the adoption of the means to be used to carry out the trust.

I will merely remark that in the early part of the past year the location at Orono, in Penobscot county, was decided upon, and that progress has been made on other points connected with the establishment of the Institution.

The operations of the County Agricultural Societies during the present year, have exhibited considerably more of energy and activity than was manifested during some years previous. This was naturally to be expected, for during the four or five preceding years the attention of all was so deeply engrossed by the tremendous struggle for self-preservation and liberty through which our beloved country was passing, so much of anxious thought and care was compelled to be given to matters related thereto, so much of sacrifice in varied forms was imperatively called for, that whatever else could, for the moment, be laid aside, must needs give place to the urgent demands of the hour.

Those years, however, have left a deep and broad mark upon agricultural progress in Maine. The necessity of obtaining food

for man and beast and means to meet the numberless calls, and this too with a diminished expenditure of human labor, led to the introduction and extensive employment of time-saving and labor-saving implements and machinery, and to greater skill in the numerous operations of husbandry.

Especially may the influence of these years be seen in the rapid extension and increase of sheep husbandry, and in the improvement of breeds of this invaluable domestic animal. This extension and improvement received great encouragement from the probability, and I may say, confident expectation, that the national requirements for revenue would insure a tariff upon wool which would yield a steady and sufficient protection to the home grower, so as to enable him to compete with production in those more favored foreign countries where neither shelter nor harvesting and housing of food for half the year are required. I regret to learn that doubts are entertained whether such a tariff may be adopted; and this not merely because the failure to secure a protective duty upon foreign wool would result in the sinking of a large amount of capital invested by the farmers of Maine; but also, because sheep husbandry is so valuable an agency for the elevation of agriculture in a country of moderate natural fertility like ours, that it can hardly be dispensed with and success attained by other means.

By the agency of the sheep, a great amount of herbage, of a quality which would serve but poorly for any other domestic animal, is readily converted into good meat and wool and manure; and thus we are at once furnished with food and the material for raiment, and with means of fertilization which will insure an increase of food in years to come.

Let the price of wool be so reduced that the farmer becomes constrained to discard the sheep, and it is easy to see that great loss, both direct and indirect, must ensue. What can be more reasonable than the demand, that, in levying the burdens which must be borne, they be so adjusted as to yield all the advantages which the nature of the case admits? I cannot relinquish the hope that such will be the fact, and that adequate protection will be steadily continued for many years to come.

S. L. GOODALE,

Secretary of the Board of Agriculture.

JANUARY, 1867. .

Mr. Chamberlain presented the following report on Topic No. 1:

What lessons in agriculture are taught by the peculiar circumstances of the past four years?

LESSON 1ST. Agriculture has improved her social relations with her more accomplished sister—*horticulture*—in seeking her advice and considering her precepts. The reduced numbers of our domestic animals, and the consequent advance in the price of meats, tend to its reduced consumption under the dictates of a compulsory economy. We believe that a mixed diet is better in our climate than a purely vegetable one; but if our future shall be a sensible departure from former habit as gross flesh eaters, that future will be blest through it.

An important and growing interest in this country is the production of garden vegetables and small fruits. This production concerns every land owner, as affecting the health, comfort and thrift of his family. This interest has increased by a much larger ratio than has the population, and far greater than that of the three important staples of butter, potatoes and Indian corn. The increase in the productions of the market gardens of the three States—Massachusetts, New York and New Jersey—was more than 100 per cent. in each of the last two decades. This ratio of increase, accelerated since 1860, with the facts applicable to so many of the States, is instructive. It indicates the direction our industry is to take as the resources of the country become further developed. After acknowledging all the proper claims of grass, hay and the grain crops, the produce of our orchards and gardens should be considered as a very important interest, and one of increasing value. Our climate matures a very great variety of delicious and nourishing vegetables and fruits to supply our tables from early summer to late autumn. Another class succeeds and supplies us for the other half of the year. These, with the products from our cows and our poultry, enable the American farmer to live better than any other people. If he is not seen to do so, he cannot blame our skies nor our soil.

LESSON 2D. It is very certain that the state of any art is intimately connected with that of its instruments. If these are imperfect, it cannot be much advanced, and this is so universally the case, that agriculture is no exception. Having taken another lesson from the horticulturist, the farmer, short handed, concentrates his operations and improves on their thoroughness. He

manifests an increased anxiety to avail himself of all aids in the way of improved implements. This matter of improved implements having been treated in an extended article at a former session, we may be excused from entering upon it in this connection, further than to name it as the lesson of the hour—a lesson that will remain a practical one when the country shall have been restored to its normal condition of affairs, and one to endure through our nation's future.

When farm labor and farm products shall be cheapened through the subsidence of disturbed elements, when our people shall have relieved themselves from onerous burthens, when domestic tranquillity shall everywhere prevail, any provision that may have been made for rapid and efficient conduct of general farm operations through a liberal investment in improved implements, will serve the purpose to save to the farmer in the more prudent expenditure of his own physical force, and leave to him time, ability and inclination to cultivate his own mind, and provide the same inestimable advantages for those dependent upon him. Thus may we read the lessons of the hour, believing there is much good in store for us and for our country, and that we shall receive of it in full measure as we prove ourselves worthy of it.

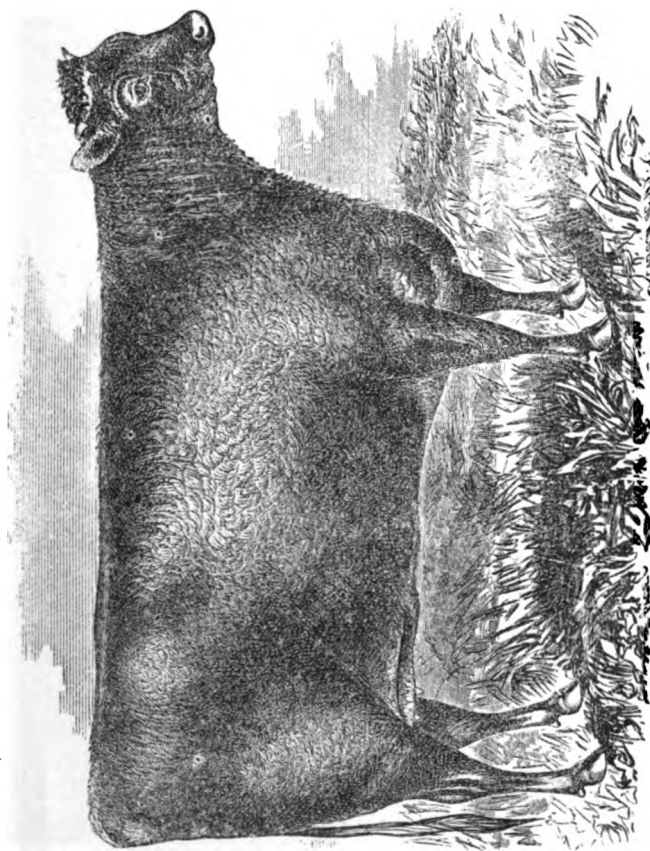
Mr. Anderson submitted the following report on Topic No. 2:

Ought the more extensive culture of peas and beans to be recommended?

It has, for years, impressed the mind of your committee that a most important point in practical and economical farming in Maine is to provide for some sure and abundant crop which may be readily *and directly* converted into human and animal food, without the necessity of carrying it to the mill or market for either transformation or exchange. Something which may be grown cheaply as regards not only labor, but also, by not drawing heavily upon the riches of the soil and consuming too rapidly the treasure on deposit there; thus truly husbanding our resources, at the same time allowing us to feel that we can well afford its free or lavish consumption. Every farmer knows the importance of having a good supply of some sort of concentrated food at his command. But it seems as if too much dependence was placed upon that one most exacting of labor and requiring of fertilizers—Indian corn—and the other exhaustive cereals—wheat, barley, and oats. And that too little regard is given to those leguminous plants which

form the subject of the topic assigned to your committee. In the agricultural branch of the Eighth Census Report, one of the most valuable agricultural contributions yet exhibited by any department of our General Government—we find the following: "With the exception of flax and decorticated cotton seed, peas and beans contain more nitrogen than any other grain. The droppings of animals fed on peas and beans are consequently more valuable than that from animals fed on any other grain. The growth of these crops when fed on the farm increases the fertility more than any other grain crops. When consumed on the farm and the manure returned to the land, or when ploughed under as a manure, peas may be considered as a renovating crop. As a crop to alternate with wheat, peas are exceedingly useful. They tax the soil but lightly, and when a heavy crop is produced they smother the weeds. They also ripen early enough to afford ample time to sow wheat after the peas are harvested." In the same report, Mr. Kennedy also says: "The great want of American agriculture is a plant which shall occupy in our system of rotation the place which the turnip occupies in British agriculture. We have no such crop. The bean at the north has more of the necessary qualities than any other plant extensively cultivated. It is planted in rows and admits the use of the horse-hoe in cleaning the land. It does not draw heavily on the soil, and contains a large amount of nitrogen, the element which the cereals so much need."

Here certainly we find much that we want, so much that it undoubtedly would warrant a wider cultivation than it has yet received. Although Maine raises more peas and beans than all the other New England States, (246,915 bushels,) the total of these two crops in New England is less than half a million bushels. And we have no doubt it might be introduced quite liberally into the food of our domestic animals in this country, as one species, the horse bean, has for years formed a very important part in the feeding of horses, neat cattle, sheep and swine in Great Britain; entering largely into the composition of all those commercial articles so widely advertised, and to a very considerable extent used, under the name of this or that man's *feed*,—Horsfall's being perhaps the one most generally known. While we acknowledge the great value of the bean, and would urge its more extended culture in the field, there is too much uncertainty about the crop; from its tenderness and liability to serious injury from frost, and the attacks of worms and insects, and from rust, for us to rest



Short Horn Heifer "LADY MARY," at one year old.

The property of H. G. White, South Framingham, Mass. Red (white star). Calved January 27, 1864. Got by Hotspur, 4030, (see note), out of Baroness by Barrington, 1229—Red Rose, 2d, by Napier (6238)—Tube Rose by South Durham (5281)—Rose Ann by Bellerophon (3119)—Rosette by Belvedere (1706)—Red Rose by Waterloo (2816)—Moss Rose by Baron (58)—Angelina by Phenomenon (491)—Anne Boleyn by Favorite (252)—Princess by Harrison's bull (592)—by the Studley bull (606).
 Snowden's bull (612)—by Masterman's bull (422)—by Mr. Harrison. Got by imported Duke of Gloster (11382) out of imported Daphne by Harold (10299)—Limpid by Viceroy (7678)—Lemon by Marquis (2271)—Lowly by Isaac (1129)—Lisette by Blucher (83)—Lady by Cecil (120).
 Lady Mary was winner of Silver Medal, (sweepstakes open to all comers), and also first prize as yearling at the show of the New England Agricultural Society, at Concord, N. H., in 1865. Her sire Hotspur, 4030, received first prize at the show of the New York State Agricultural Society, in 1863.

here in search after that material aid to which we may confidently trust as one of the principal supports in a proper system of husbandry. But may we not find all the required qualities and conditions in the pea?

With proper care and the simplest means all its enemies can be guarded against. It is among the hardiest of our plants. It will produce according to culture from five to fifteen bushels to one of sowing, of food adapted to the use of every living creature which properly belongs upon the farm; and except hay, is perhaps less liable to injury and loss from storage than any of our crops.

This topic which has been assigned to your committee in the form of a query, seems to us an eminently practical question; one which cannot be satisfactorily treated in any merely speculative way, and although we ask leave to submit hereafter, to add to and form part of this paper when complete, such analysis of the two plants named in the topic, and other extracts from the writings of more able men about them, as we have thought might add interest and perhaps instruction to a more deliberate study of the subject matter, yet we desire to so fashion this preliminary report as to court and elicit the freest criticisms from members of the Board, animated by the desire to counsel their brother farmers well, and controlled by the knowledge they have derived from actual experience and observation. The conclusion to which your Committee have arrived is that the Board of Agriculture should

Resolve, That the largest practical cultivation of the pea cannot be too thoroughly urged upon every farmer in Maine, as one of the surest crops that he can grow, and every way a remunerative one; and that a much greater breadth of land than has yet been given to it might be very profitably devoted to the bean crop.

Mr. Wasson submitted the following report on Topic No. 3:

Should measures additional to the act of Congress be adopted to secure immunity from the cattle plague?

To show the necessity of "means additional," a brief expose of the history and character of the rinderpest is required.

This disease, which is now raging so fatally in England, and that has baffled every attempt to check its progress, is of all infectious diseases the most to be feared. Every precaution should be taken without delay to prevent its introduction to this continent. Once with a foothold here, none can foresee the consequences.

The disease is known in England as the cattle plague, in France as *typhus contagieux*, in Germany as the rinderpest.

The disease first appeared among the cattle inhabiting the *steppes* or treeless plains in the southeast of Russia. From the 47th to the 55th parallels of latitude, the Volga, Don and Dneiper rivers, with their numerous tributaries, flow leisurely through a vast plain of rich soil, occasionally overflowing the lands, causing a luxuriant vegetation. Here stock is abundant, with no winter food provided, as in California. Here rinderpest originated.

The pleuro-pneumonia is well said to be a most formidable disease, destroying as it did in Holland \$660,000 worth of cattle in a single year, and in two years more than 28,000 animals. But rinderpest in England in the month of November last destroyed 5000 head, and later reports show that 50,000 animals have died in England within the past six months; a number equal to 17 *per cent.* of the cattle in Maine.

Of the character of this disease it is said "that in all cases which tend to a fatal termination the animals rarely live beyond the fourth day. Many die the second day. The greater number die the third day. The deaths number about 90 *per cent.* The nature of the disease seems closely allied to spotted fever—a poisoning of the blood. An English paper says, "nothing can be more fallacious than the supposition that the disease is curable." The experience gained in England confirms that of Europe as a whole, that medical skill is powerless in arresting its progress. The homœopathic theory of curing diseases brightened the gloomy prospect for a few weeks. But even that gleam of hope has been blasted; the treatment proved an utter failure. It is one of the most infectious maladies of which we have any experience. It is capable of being conveyed from animal to animal by persons and articles of clothing. On one of the estates in Austria where the cattle were diseased, a carpenter's apprentice employed on the estate escaped the vigilance of the guards and went to his father's house, which was distant about a mile. While there he repaired his father's cattle stall, and also changed his clothes. The rinderpest, in consequence of this, broke out among his father's cattle, and all were destroyed.

One of the worst features of the disease is, that animals appear perfectly healthy so long after they are infected; for it is said the disease may lie *dormant* in the system as long as fourteen days

before any symptoms are seen—a length of time equal to that of a voyage from Europe.

After medical skill had exhausted itself in vain attempts to combat the disease, recourse to military *cordons* established by government was had. Wherever the disease broke out, the diseased cattle were slaughtered by order of the government, and a military *cordon* drawn around the place. All dogs, cats, rabbits, domestic poultry, pigeons, &c., have to be kept in places of security and close confinement. If the disease exists in a village through which a high road runs, the course of the road is turned if possible; but when this is not practicable, then a guard accompanies the several travellers who arrive at the boundaries of the *cordon* to see that they do not go upon any of the infected premises. The *cordon* is frequently maintained by the peasants, but none are taken for this purpose from an infected village, the selection being made from contiguous villages or farms where the cattle are healthy.

“As soon as the malady is observed in a commune, notices are sent to all the surrounding places, that precautionary measures may be immediately adopted by the owners of cattle. Each commune has to provide a place for the burial of the animals which die or are slaughtered, and also a wagon and horses to carry them upon; and on the disease passing away the wagon is burned and the horses washed with a solution of chloride of lime. The place of interment is likewise enclosed, and not allowed to be disturbed for several years.”

In spite of all these energetic measures, this malignant disease has visited nearly every country in Europe.

It was imported into Holland. It was imported into England. And if ever introduced into this country, it will be by that same agency—*importation*.

Once here, the die is cast, and a loss of millions of dollars worth of cattle the result.

The means of communication between us and England have become so rapid and so easy, that her relative position on the globe has been changed, bringing her, commercially considered, to our very doors. In that regard, as well as geographically considered, Maine, of all the States, is her nearest neighbor. Our thousand miles of sea-coast, with its capacious and inviting harbors bordering upon the great “highway of nations,” expose us in a pre-eminent degree to danger. Like the outer ledges upon her coast,

she is first in the way. With the province of New Brunswick belting our eastern frontier, the Canadas contiguous on our northern and northwestern sides, adding immensely to increase our exposure, and railroads, having a foreign terminus, intersecting the State at several points—prospectively at least—including numerous other over-land channels of communication, all demand “additional measures to secure immunity from the cattle plague.” From the Grand Falls to the mouth of the St. Croix, the boundary line of the State, at each point of ingress or egress is simply a *mathematical* point. The communication across the “line” is as perfect and unbroken, and the social relations of every day life are as closely interwoven, as in neighborhoods more remote from that line.

Here is contact, social daily contact, an extended line for *communication* by contact, an intercourse that “acts” and edicts are powerless to interclude, until into those relations can be incorporated a wholesome regard for the observance of such laws, until each, united by common interest or danger, becomes a law unto himself. This is a subject for alarm, for genuine alarm. We just learn that the disease has broken out in the Zoological Garden in Paris, and the goats as well as sheep and cattle are dying. Mr. Clay, the American Minister, writing recently from St. Petersburg, says, “the cattle are dying by hundreds and the sheep by thousands.”

The foreign files, by every arrival, are still repeating the story of unabating malignity, of new and extending conquests, in spite of sanitary measures and medicinal skill, thus affording fresh fuel to kindle agitation in the public mind. Here is our security in maintaining a thorough and an efficient blockade, an absolute prohibition of traffic, in animals, or any and everything appertaining to them, or that has been in contact with them.

The following preamble and resolve accompanying the report were adopted :

Whereas, A malignant disease is making fearful ravages among the cattle and sheep of England and other countries of Europe—and *whereas* said disease or plague is easily communicated by contact—and *whereas* Maine, from its geographical position, is more exposed than any other of the States—and *whereas* in the opinion of members of this Board, measures additional to the act

of Congress are required to secure immunity from said disease or plague ;

Resolved, That the Governor and Council be requested to take immediate action in the premises, by correspondence with the local Governments of the British North American Provinces, contiguous to this State, and invite their co-operation to the same end.

Mr. Prince submitted the following report on Topic No. 4 :

What products can be sold to go off the farm with the least detriment to its fertility, and at the same time be profitable to the producer ?

The above is without doubt one of the most important questions that can be asked the farmers of Maine, as we cannot, like those of the western prairies, keep up the productiveness of our farms, without replenishing them with some kind of fertilizers, and we believe that the large body of our farmers will agree with us when we say that we must rely mainly upon home manufacture rather than such concentrated fertilizers as are usually sold to our farmers ; not but what great benefit is many times derived from these fertilizers, but that they cannot be counted on as sure of producing the desired effect.

We have so many different varieties of soils, that what would be considered a good system of farming in one locality would inevitably result in a failure in another. Still, there are some general principles that can be laid down, by which we can all be governed—principles that will hold good upon all soils and in any part of our State. One of these is, never sell any corn, grain, or hay from our farms, except perhaps near the seacoast, where an unlimited supply of dressing may be obtained without money and without price. All the crops of our farms should be consumed upon them. Another principle should be, never let a season pass without making a strong effort to increase your fruit crop, as some of the different varieties can be raised and sold from any soil in Maine, and the land at the same time be kept in good condition, with a small outlay for mulching that can be obtained in almost unlimited supply in any locality. The apple and pear can be raised on any of our gravelly soils in any part of our State, with a profit that would rival even the fabulous stories of profitable crops of the great West.

Many of the earlier varieties of grapes are now becoming a sure and most profitable crop on almost any soil that is well dressed,

and we would recommend that our farmers should give more attention to their cultivation. There are but very few farms but what have some swampy place where cranberries can be grown with even greater profit than any other crop, and that too without any outlay after the vines are once well set. Will not our farmers look around and see if they have not some deserted spot on their farms that is now an eye-sore to them, that can be turned to good account with this crop? We are satisfied that although our fruit crop has more enemies to contend with than formerly, it can now be made the most profitable and least exhaustive of any that can be raised in Maine.

Fruit being the leading branch, we must ascertain what live stock is best adapted to our location, not only returning us good profit at present, but keeping our farms in good condition. On one that has a pasture that grows a good quantity of rich nutritive grasses, and cuts a large proportion of good English hay, the cow should undoubtedly take the lead, as from the refuse of the dairy swine can be kept, and with the two combined with judicious management, a farm can not only be prevented from deteriorating, but made to improve in productiveness. But a farm that cuts a large proportion of swale or meadow hay, it is folly to think can be made profitable as a dairy farm, for cows must not only have good pasturage in summer, but good English hay, with meal, roots, or, what is better, swill, in winter. On the dairy farm, we would mulch the orchard as far as the limbs of the trees extend, and as soon as the apples begin to drop from the trees, turn in the store pigs, that they may pick them up, to prevent their being a nursery for pests for succeeding years.

On a farm that cuts a large proportion of poor hay, sheep should be the leading stock, as they can be kept in good condition through the winter on very poor hay with the addition of a few roots or refuse apples, daily, and although a farm cannot be kept in as good condition with sheep as with cows, it can be equally as good as in rearing neat stock, and at the same time be a source of much greater profit to the owners. Your orchard, too, can be pastured with sheep, after the trees attain to a size large enough, so that they will not be injured by them. We think that any one following the course pointed out above, and selling his fruit, butter and cheese, or wool, as the case may be, can not only make farming remunerative at present, but add yearly to the productiveness of his farm.

Mr. Smith submitted the following on Topic No. 5 :

Can farming in Maine be conducted with success as compared with other branches of industry?

A great many things in this world are taken for granted ; the faith of one is too often pinned to the sleeve of another. Opinions are formed without investigation ; certain notions are gathered from casual observation. There is a certain amount of jumping at conclusions. In some or in all of the ways thus indicated, may not the opinion, so freely expressed, have obtained that the field of agriculture is less inviting than that of any of the other industrial interests. If it be true that farming is not a paying business as compared with the other branches of industry, are there not other causes or surroundings, to which the default is chargeable, locality, mismanagement, want of interest, or a divided interest. A farmer, to succeed, must love his calling, and devote both his time and attention to it.

It is said that but about one in thirty succeed of those engaged in lumbering. How untrue of farming. In mercantile life or in manufactures, the number of those who acquire a competency is believed to be far less than those who reach the same results as farmers.

But few perhaps are aware of the amount of capital invested in agriculture in our own State. But few would suppose that sum to be what it is, \$97,424,385 ; and this large sum is paying a dividend yearly of more than 14 per cent. ; the orchard products alone foot up the neat little sum of \$501,767. Now we have not the means of knowing the amount invested in other avocations, but we feel safe in saying, that the investments in farming will not suffer in the comparison. If it be true, and true it is, that the business of farming is paying 14 *per cent.* on a dollar, we can confidently say to our young men, here in Maine is as inviting a field as elsewhere, and farming in Maine is as lucrative and as promising a business as any other. And in view of the facts herein presented, we say to our brother farmers, push on your enterprises, your calling is not only honorable but profitable. Your investments in your business are paying as good a dividend as the other branches of business in the State.

Mr. Carpenter presented the following report on Topic No. 7 :

On which can a farmer live the easier, on a farm of two hundred acres or more, or one of forty or fifty ; the soil of like quality ?

Here is something that cannot be weighed or measured, and we shall be obliged to exercise one of the rights conceded to the people of this section of our country, and resort to some "guessing," in order to arrive at a probable solution of this, to the farmers of Maine, important question.

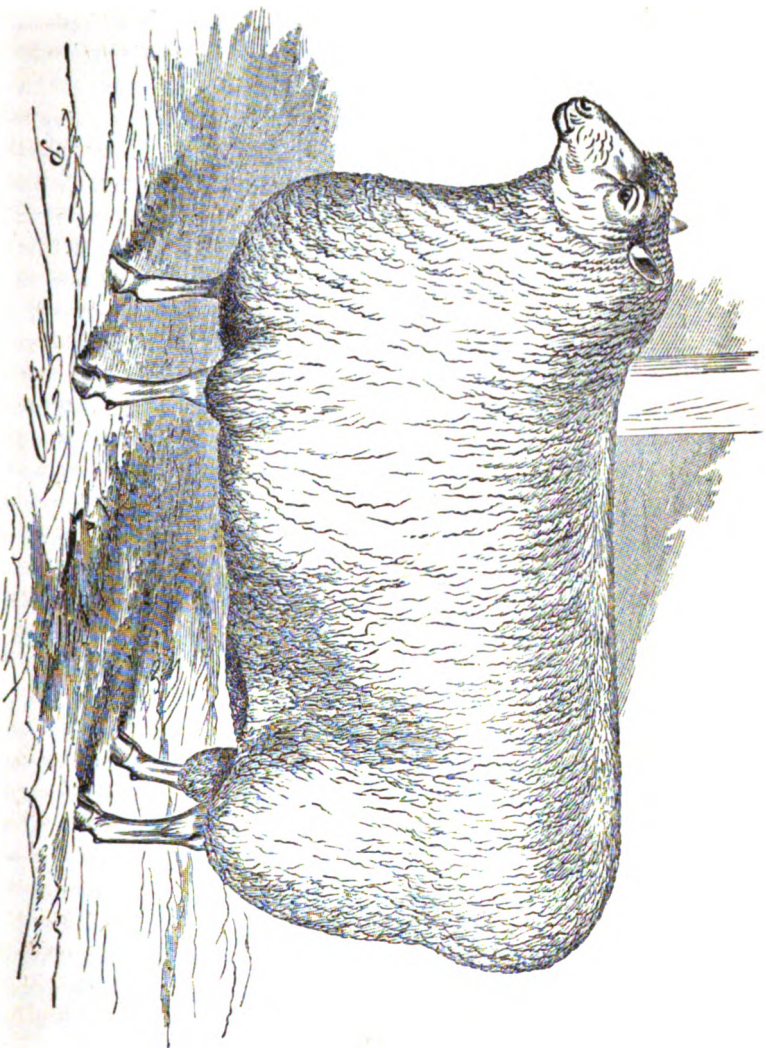
In making a comparison, it is assumed that the circumstances of the farmer are the same so far as the family and location are concerned, and also equal as to skill and ability to labor in the prosecution of his business. It is understood that the style of living in both instances is to correspond. The buildings on the two farms will be equally plain or expensive, according to the taste or ability of the occupants, and the outlay would be the same, with this exception, that the larger farm will require the addition of barn room sufficient to house the stock and crops.

We frequently hear remarks of this kind : " You have too much land, enough for two farms ; why not divide it, or sell out and buy a small place where you can live easier ? " And on the other hand, it is common to hear something that sounds more complaining : " I can do but little for a living on this small farm of only forty acres. I have a large family, and it takes about all we can produce to live on. " Everything produced on the farm and consumed by the family is worth what it would cost in the market, adding thereto the expense of transportation. The farmer that comes the nearest to living within himself may in the end, we believe, be found to have met with the best success.

" The soil of like quality, " taking an average of the farms as they are now through the State, will admit of a division into tillage, pasture, and woodland of about one-third to each. The forty acres, about fifteen in field, fifteen in pasture, and ten in wood-lot. The same proportion will give for the two hundred acres seventy-five in field, seventy-five in pasture, and fifty in wood-lot. This division is not made with any intention of raising an objection to a system of rotation, where the soil and circumstances will admit.

It will be readily admitted that the outlay for the dwelling, furniture, carriages for family use, and expenditure for the ornamented surroundings, together with the expense of keeping all in good repair, will be the same in one case as the other. That for other

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IMPORTED COTSWOLD RAM, "HIS ROYAL HIGHNESS."

Bred by Robert Garne, Aldsworth, England. Imported by and property of Burdett Loomis, Windsor Locks, Conn. Winner of 1st prize as a two-year-old at Brattleboro, Sept., 1866. Winner of sweepstake medal offered for best Long Woolled Ram of any age, open to United States and Canada, at Brattleboro, Sept., 1866.

buildings will of course vary according to the size of the farm. The additional cost of land will have to be taken into the account.

The objection usually raised against the small farm, and that entitled to much weight, is the want of land. The complaint generally most frequent on the large farm, is a want of labor. If the occupant of the former has a family of boys and girls, they very soon find the limits of the farm too small, and either the children or the father seek employment elsewhere—often at a distance from home and its protecting influences—causing a separation of family ties that may never be united. If the owner of a larger farm has a like family, his want of labor is in a great measure supplied, and the extent of his land will give them useful employment and scope for improvement.

Again, if there are no spare laborers on the small farm, and the owner is obliged to hire, he will not, as a general rule, engage help by the month, but by the day, as his needs require. He will endeavor to perform all the labor his strength will admit of, and it is believed look with much doubt upon the wisdom of leaving a large farm for a small one, with the expectation of a less laborious life. Should the larger farmer be similarly situated he will consider himself able to employ help constantly, and will always aim to have a good strong man to relieve him of the heavier portions of farm work.

The want of land can seldom be supplied to advantage by the small farmer. Whereas the want of labor experienced by the owner of the large farm can usually be met without much difficulty. The first will also be obliged to keep a small team, whether of oxen or horses. The other will be able to keep a team of either oxen or horses, or both, of sufficient strength to do all heavy work, such as "breaking up," &c., without the expense of additional teams, or of exchanging with neighbors, as the practice of many is. The cost of labor-saving machines and implements, together with farming tools to cultivate the forty acres economically and successfully, will amount to nearly as much as for the two hundred acres.

The additional quantity of land will enable the owner to keep a much larger stock on the farm, the annual growth of which will be a source of income. He will be able to rear his young calves and other young stock, and sell them when they have arrived at maturity, and are the most valuable. On the other hand, the small quantity of land renders it necessary to dispose of many of the

calves to the butcher, for want of room to keep them. The ten-acre wood-lot, it is estimated, if well husbanded, will support the fires. A like quantity taken from the fifty-acre lot will leave forty acres, which, in many localities, may be turned to good account. What has already been said in reference to labor, may be applied to the affairs of the household, as well as to outdoor labor, with equal force.

We are aware that the friends of the theory, "Two acres enough," "Ten acres enough," and that small farms have advantages over large ones, will be very likely to disagree with the position taken in this paper. But as yet, no sufficient evidence has appeared to prevent any one who is in possession of two hundred acres or more, keeping only one cow, or going into the business of raising blackberry canes on a corner of his lot, if his locality, circumstances and inclination should happen to lead him in that direction.

It is not the intention of the writer to say anything to dampen the ardor or enthusiasm of the cultivators of small quantities of land. Too much commendation cannot well be bestowed for the courage and industry exhibited by many in rescuing some forbidden portion of the earth's surface, and making it both beautiful and profitable, and many a farmer on forty acres has done more for the improvement and dignity of agriculture than some of those in possession of broader acres. What especially is contended for, is that nearly all the advantages claimed by the friends of a small quantity of land, are also possessed by the owner of the larger quantity, and that his hopes of relief by a change would, in all probability, be disappointed.

Mr. Goodale submitted the following report on Topic No. 9:

The committee charged with the following topic, viz: "*To consider the practicability and expediency of transferring to the Agricultural College, whenever the same shall go into effective operation, the labors and duties of the Board of Agriculture,*" respectfully report as follows:

The policy of the State, which has become defined and established in the twenty years past, toward that great interest which embraces a very large proportion of the population and wealth of the State, may be fairly characterized as a liberal one. At various times the legislature has created instrumentalities calculated to

foster and encourage it. To societies formed for the same purpose, it annually extends material aid.

To a considerable extent, these organizations accomplish their ends *by the diffusion of knowledge*, and so, in a true, although not in the ordinary acceptation of the term, they may be considered as educational in their nature.

By the premiums offered by agricultural societies emulation is excited, and when the various specimens of crops, of animals, of implements, etc., are brought together, opportunities are furnished for comparison and for the study of facts and of objects which are highly instructive. The labors of the adjudging committees do sometimes, and might much oftener than they do, result in the preparation of a report, which, besides announcing the awards of premiums offered, embraces the data, facts and views upon which the decisions were based, and often much valuable information upon the general subject involved.

Besides these, whenever anything is offered for premium, the nature of which admits of it, as a crop of roots or grains, or a fine animal, the law requires a statement to be made which shall convey to all interested in the subject a knowledge of the methods by which and of the conditions under which such a result was attained, and how it was brought to the degree of perfection exhibited. The publication of such statements may not only result in diffusion of knowledge, but in positive additions to our stock of knowledge.

There is greater need of such aids to progress in agriculture than in other branches of industry, from the fact that those who pursue it, are, by their vocation, for the most part, necessarily confined upon their own acres, and so being isolated from each other, have little opportunity otherwise of learning what improvements are made, and how the most productive results are attained.

The State Board of Agriculture is another instrumentality created by the State. It is a deliberative and advisory body, holding an annual session for discussion and investigation of matters pertaining to the general husbandry and rural economy of the State. Besides which are presented essays, carefully prepared at home before the session, and also reports of experiments which have been instituted and carried on in order to ascertain the conditions of successful cultivation. Among the duties of the Secretary of the Board, we may allude to the requirement that he become acquainted with the agricultural capacities of the State, its soil,

its crops, its means of fertilization, its methods of husbandry; and to suggest improvements, to learn what progress is making in agriculture in other States and countries, to correspond and invite exchange of documents with kindred associations elsewhere, and to prepare an annual report embracing the doings of the Board, the results of his investigations, with such recommendations or suggestions as the interests of agriculture seem to require. This report is published and circulated among the farmers of the State.

It may be said, therefore, that the aim of the Board is, even more exclusively than of agricultural societies, the acquisition and diffusion of knowledge. The success which has attended the employment of these instrumentalities is marked and highly gratifying. Perhaps the most tangible and definite indications of this success are furnished by a comparison of the United States census returns for 1850 and 1860. Although these were alluded to in a report made to the Board some time ago, it may be well here to refer again to some of the facts thus elicited. By such a comparison we find that, be the causes what they may, we did not retain our natural increase in numbers, the increase of population in that decade being only six and one-half per cent., but notwithstanding this the number of acres in farms increased from 2,039,596 to 2,677,136, or about thirty per cent. We find the value of farms to have increased from \$54,861,748 to \$78,688,525, or equal to forty-three per cent. Be it remembered that none of this can be ascribed to advanced prices due to a depreciated currency. It was a time of peace and of equable values, all alike based upon a currency as good as gold. The improvement in stock was even greater—while in numbers the animals increased less than seven per cent., (or just about the same as the population,) the value advanced from \$9,705,726 in 1850, to \$15,437,380 in 1860, being no less than fifty-nine per cent., and the value of slaughtered animals showed an advance of sixty-eight per cent. This is a record of which any people may be proud; and while it is not claimed that all this increase was due to the labors of agricultural societies or of the Board, yet it may be fairly claimed that the various improvements by means of which this result was brought about, were, all of them, *initiated* and steadily fostered by them, and that thousands of farmers who had no direct connection with them were excited to emulation, stimulated to improvement, and induced to adopt improved methods when they had seen these prove successful with others.

The years which have passed since the last census was taken, have been eventful ones. The energies of farmers have been taxed to the utmost. Is it unwarrantable, in view of the above facts, to assume that the progress made, the improvements effected, and the knowledge gained during the previous years, were largely instrumental in enabling the accomplishment of what has since been done by the lessened numbers engaged in agriculture? We think not—nor do we believe that any candid mind will fail to be convinced that the fostering aid extended by the State to this, its greatest material interest, has been repaid many fold in the increased wealth and power of the State, and its present ability to bear the unusual burdens which have fallen to our lot.

We are not aware of any desire to see these instrumentalities done away, or seriously modified, but we are approaching a new era in the history of agriculture in Maine, and it may be well to cast a glance, as far as we can, into the future. Before long, we hope to see a new instrumentality at work, which, we trust, in due time, will accomplish greater results than have yet been attained. The Congressional grant in aid of a college for the liberal and practical education of the *industrial classes*, has been accepted by the State. An act to establish such a college and defining its characteristic features has been passed. We trust the time is not far distant when it will go into operation. Its means are small, much smaller than may be needed to secure able teachers and other requisites to give it due effectiveness. As yet, the State has bestowed upon it no endowment or stipend—whether it may be uncertain.

The object of this institution is to train up generations of youth better drilled than their fathers have been in the practice of farming, and more conversant with those laws of nature which must ever underlie practice. The farm upon which the college is located is to be the theatre of careful investigations. It is expressly provided for by the act of Congress, that an annual report shall issue therefrom regarding the progress of the college, recording the results of the experiments and investigations made, and such other matters, including statistics, as may be deemed useful. Having clearly in view the above named facts and prospects, we are better prepared to approach the questions embraced in our topic—Is it practicable and is it expedient to transfer to the Agricultural College the labors and duties of this Board? or, more properly, *will it* be practicable and expedient? These are ques-

tions of such importance as to demand serious and careful thought and investigation. We are not prepared to do more at this time than to invite attention to this subject. As members of a Board representing the agricultural interests of the State, our desire is simply that the greatest good to the cause be effected with the least expenditure. We have no desire for place other than as it may afford means of greater usefulness. There is no occasion for hasty action now, and if its consideration be entered upon in season, there can be no excuse for hasty action hereafter.

As the result of such thought as we have been able to bestow on the subject, we may remark that there does seem to be a possibility that by adding to the means of the college an amount equal to the expense attending the operations of the Board, more might be accomplished by some persons connected with the college whose acquirements and training have specially fitted them for the work, and whose time is given to such labors continuously through the year, and year after year, than can be expected of members of the Board as it is now constituted.

It seems not unlikely also, (if means admitted it) that the report to be issued from the college might be made such as worthily to supersede the report now annually issued from the Board, that it might be circulated to an equal extent and with as good result among the farmers of the State; and that, generally, the concentration of means and efforts might accomplish more valuable results than can be expected by laboring separately. While we would deem it palpably unwise to decide these questions in advance of the further development of the college, and the selection of the persons to be charged with its more active operations, we commend the consideration of the topic to all who feel interested in the advancement of agriculture among us.

Mr. Wasson presented the following report on Topic No. 8:

Is it expedient for the Board, while regarding the fearfully increasing pests to vegetation, to recommend the appointment of a State Entomologist?

Mr. President: I propose to discuss this topic in general terms, rather than to that specific point indicated in the text.

"Have an eye upon your fences," was for many a year the initial motto of the Old Farmer's Almanac, until repeated so often it came to be regarded as an indispensable condition of success,

to build efficient barriers against whatever it was desired to shut in or to exclude.

Time was, when with the greatest investment of capital in this country in common fences, (and the same is true to-day,) when to be environed by a lawful fence, was a guarantee against mischievous or destructive animals. But under this *insect* dispensation, this huge amount of capital is, to all intents and purposes, dead, as a protection. For o'erleaping ditch and dike, scaling fence and wall, inexorable as death at the appointed time, they come. Monarchs of all they survey, the whole vegetable world pays tribute to satiate their voracious demands. Nothing escapes, nothing is invulnerable. Their capacity to devastate, to "lay waste," is incredible.

As foragers they excel. Millions of dollars worth of vegetation are annually destroyed, and too often has the cause been attributed to some fancied freak of nature, as if her laws were dictated by coquettish whims.

For years the midge in wheat was supposed to be a mildew or blight. A peculiar shrivelling of rye, supposed to be caused by some unfavorable condition of soil or climate, has recently been found to be the work of a minute insect. And who is prepared to say how much some insect has contributed towards the cause of the potato-rot.

For a number of years before insects were supposed to seriously injure the cultivated crops, the caterpillars were known to be making sad havoc with the forest trees in Europe. In 1837, Switzerland paid \$1000 for the destruction of these pests, to save the forests. From 1790 to 1800, the caterpillars destroyed \$300,000 worth of vineyards on the borders of the Rhine.

Within the past ten years the Swiss government has paid for ten millions of butterflies.

But with the work of devastation going on *here*, a diverting of our attention *there* savors strongly of "misery seeking company."

It is estimated that in Illinois the midge destroyed in a single year \$20,000,000 worth of wheat, and in New York \$15,000,000 worth. With the advent of the midge as a co-worker with the Hessian fly in 1834, the culture of wheat was almost temporarily abandoned in Maine, excepting in favored localities. In Monroe county, N. Y., which in 1845 raised more wheat than all New England, the midge proved so destructive, that for several years

the propriety of abandoning the wheat crop was seriously discussed.

It is estimated that 15 per cent. or \$75,000 worth of apples are destroyed annually by the caterpillars alone, in the State of Maine. Who can estimate the real or prospective loss of apple trees caused by the borer, or the value of fruit punctured and destroyed by the curculio?

While the number of plant-feeding insects, says Harris, "is not legion but legions in our country," there being some 25,000 distinct species, every year is adding by importation to natural increase, to spread over the country, causing losses too great for calculation.

Every year, with the return of vegetation, come again myriads of insects, old acquaintances and new, to prey upon the farmer's toil.

It has been recently stated that in the western basin of the Mississippi, an insect fatally destructive to the potato has appeared, which is travelling eastward at the rate of 50 miles a year. This insect, called the Ten-Lined Potatoe Beetle, was first discovered on the Upper Missouri.

In June, of 1864, in Nebraska, an insect, hitherto unknown in the world, was discovered, called the "Bee-Killer"

During the season of 1865, an unnamed and unknown insect was discovered preying upon the Canada thistle. If they will only stick to the thistle, we will quote so much of Shakspeare to them as to say "your graces are right welcome."

We may well query, from whence these new insects? Are they of spontaneous origin? Is the work of creation still incomplete? Has the "letting down of a great sheet from heaven"—as in Peter's time—"with all manner of creeping things," been repeated?

The capacity of insects to increase, to propagate their kind, is incomprehensible. Some species of the caterpillar will lay from 150 to 600 eggs twice in a summer. Some insects, as the pine spider, will lay 800 twice and often three times in a season. Indeed, many of them, like the hens in Holland, are "everlasting" layers. The fecundity of plant-lice is marvellous. It is said that one aphid may become, in a single season, the progenitor of over five thousand millions of descendants. With such enormous powers of multiplication, we might reasonably apprehend the speedy destruction of all our crops. But the increase is governed by

natural causes, and by natural causes held in check. The balance of causes has only been removed, giving the insects much the longest end of the lever.

This condition of affairs can and must be reformed.

The importance of a knowledge of insects must be obvious to every one who reflects upon the devastations committed by them. The problem of course is, how to destroy this legion of enemies. To do this with the greatest effect, we must watch them through all their changes.

But however desirable a knowledge of entomology may be, but few have the time to acquire it. The farmers at large must glean what information they can, and guard their crops as best they may—but I submit if its importance does not demand the establishment in every State of some *central Head* with whom this science shall be a speciality. Some point from which shall radiate instruction, information and protection.

We have accustomed ourselves to suffer the depredations of insects as a "train of abuses" from which there was neither escape or appeal. New guards for our future security are now demanded. Without them, however much our operations are governed by the most approved rules of agricultural jurisprudence, success, the end desired, is not attained. New guards against a new enemy must be invented, or old guards revived against an old enemy multiplied to excess.

As a first step towards its accomplishment, I submit the following resolution :

Resolved, That the Board of Agriculture recommend the appointment of a State Entomologist.

Mr. Bigelow submitted the following report on Topic No. 10 :

Can effective measures be adopted to increase our crops of hay without the use of barn manures or concentrated fertilizers?

In treating this topic, we are aware of the difficulties under which we labor, in instituting methods of cultivation upon such portions of our worn out meadow lands, as will produce the desired result without the use of manures or fertilizers, yet we propose to offer a few hints ; and first, plowing and seeding with clover, and turning under when the clover is ripe enough for the seed to grow, and repeating this until the soil becomes enriched with vegetable matter, would be a safe and profitable method to prepare the soil for a future crop of hay ; at least we are told that

it has been extensively practised by agriculturists in New England and the Middle States with satisfactory results, and we have no reason to doubt the fact.

Our second method would be to plow in the month of June and sow buckwheat, Indian corn, or other seed for a grain crop, and turn this under in August, and then seed with timothy and clover by way of preparing the ground for a crop of hay the next season.

Summer fallowing, we can have no doubt, would be a profitable method to pursue to bring our exhausted meadow lands to the production of larger crops of hay.

The harrow may be used in August on non-producing meadow lands with good results. It would loosen the soil among the roots of grasses, and by sowing grass seed (not sparingly) would make a profitable return for all needful expenditures.

The mower and scythe may both be used so as greatly to injure the succeeding crop of hay, by cutting the grass too close. Great care should be taken not to cut less than two or three inches from the root; cutting clover and timothy below the lower joint, lets in the water and destroys the plant.

The practice of feeding meadow lands, after the crop of hay is taken off, or before, is one which we believe injurious and largely lessens the crop. Cannot some general method be adopted to avoid the necessity of pasturing our meadow lands, by instituting some green crop on which to feed and be a future benefit to the agriculturists of Maine?

Rotation, or changing from meadow to pasture and from pasture to meadow, would, oftener than generally practised, naturally have a tendency to increase the crop of hay.

Drainage, whenever required, is a most effectual method of securing larger and more uniform crops, and hay of better quality also.

The hay crop, being the largest and most important of all in this State, as well as the basis of all our farm operations, should receive the greatest care and thought, and no means neglected to insure its success.

Mr. Jeffers presented the following report on Topic No. 11 :

Should the use of horses be encouraged to the exclusion of oxen, for farm labor?

That horses have taken the place of oxen to advantage, in many branches of business requiring animal labor, is evident to all. We

no longer see teams of oxen wending their way twenty or thirty miles, with spars, keels, shingles or other lumber. Railroads in some sections, and horses in others, have taken their place. The slow gait of the ox, and his increased value other than for labor, have made the horse more profitable for these purposes: so, in the lumber region, the timber being exhausted on the banks of the streams and near the lakes, the long roads now used require an animal of quicker pace, and the price of beef makes it expensive to leave the "tallow on the landing," and bring the team out with only the "hide and horns," which was the motto in the days when lumber was king, and the pine tree thought by many to be our only resource. Oxen are now used to some extent for lumbering, and it is maintained by some, that they are more profitable when properly used, even on long roads. We often see teams that have made a good winter's work, come out in the spring, fat and sleek, so that after a few weeks feeding they are in condition to grace the stall of some city market.

Horses have also taken the place of oxen to some extent in farm labor, and we think in some instances to the farmer's disadvantage. While the horse has more attractions, in his lively actions and excitable temperament, we think the prosy ox more economical, and better suited to much of our farm labor; and to give a reason for the faith within us, we will enumerate some of his advantages. It is less labor to harness the ox, and the cost and wear and tear of harness and implements are much less than with the horse. He has the advantage of being put to labor at an earlier age, enabling the farmer to obtain both labor and growth at the same time. With the horse, we have to wait until he has nearly attained his growth, and then he is not a pleasant and safe animal until he has accomplished one or more years work, so that, when he is fit for farm work, he has attained his full value. Oxen can be turned into cash at their full market value at almost any time, while the horse, being valuable for that one purpose, has to wait for a market. The liability of the horse to accidents which diminish his value, or render him worthless, is a large item against him compared with the ox. The season requiring constant animal labor is short, and while the ox is paying for his food in flesh and growth, the horse is an expense.

We know many farmers, who keep but one yoke of oxen to do their farm labor, who realize from fifty to one hundred dollars from the growth and flesh of their oxen yearly, and this almost wholly

on hay and grass. We think we are warranted in the assertion that, as a general thing, take the country through, the farmers that keep good fat sleek oxen, are more successful than those who keep horses to the exclusion of oxen; not but that some good farmers use horses exclusively, (and no doubt under some circumstances they are best); still, as a general rule, we think the horse should not yet take the place of oxen for farm labor; that instead of selling our steers, at one, two, or three years old, to go out of the State, they should be worked on the farm until matured, and fitted for beef.

On the evening of January 29th, in the Representatives' Hall, Mr. French pronounced the following

EULOGY ON THE LIFE AND CHARACTER OF DR. EZEKIEL HOLMES.

Great men live two lives;—the one material and simple in the midst of our common humanity, the other memorial and sacred in the just appreciation of future generations. The world is slow to recognize its great benefactors, and has no standard to measure their influence till after they have passed the pale of mortal existence. While among us they live and move as do their fellow men; the soul-aspirations, the heart-impulses that are the secret springs of action in their lives, are not felt by the busy multitudes that throng the ways of the world, and when at length they pass to that exalted state whence their aspirations came, and where the generous impulses that so often moved them to godlike acts here meet fraternal greetings from kindred spirits, men wonder at the void they have left, and recall their many virtues as they would gather up lost treasures.

Those whose names are most illustrious as philanthropists and well-wishers of mankind, have lived in spirit far in advance of their time, anticipating the world's millennial state by hundreds of years. They have been to us glimpses of a nobler man, of a purer life, of a more exalted being, such as the good hope to attain to and the promise is the world shall see. They have chafed sorely at the wickedness around them, and sometimes have drawn darker pictures of life and human depravity than the most unfavorable construction given to passing events would warrant. Others no less exalted in spirit, but always recognizing the great facts inseparably connected with man's earthly existence, have always labored for the greatest good of the great whole, and have never failed to make their lives sublime. The foot-prints such men leave behind

them are as distinct as bird tracks in the "old red sandstone," and the record they bear as reliable as the eternal testimony of the rocks.

The masses judge of men and things from external circumstances. To them earth is earth though diamonds lie embedded in its mould, and shining sands attract the simple and unlearned more than the fine gold they see not.

There are men whom some great wave of popular favor brings into notice, and for a time they are able to sustain themselves before the public, but if there are no sterling qualities of head or heart, they soon sink to a level with the common strata of mankind, and are soon lost sight of among the crowds that go down to oblivion.

Humanity in the end is true to itself, and sooner or later acknowledges the power and might of individual influence. Greatness wears no trappings—needs none. The conception of great thought is its insignia, and the execution of mighty deeds gives the world's commission to command. *All* do not wear both alike; *all* do not bear the palm; even as *great* gods were few when divinities dwelt with men and hero-worship was supreme.

Such are some of our reflections when we contemplate the life and character of the late Ezekiel Holmes. A man whose like had not been before him among the ancient men of our State; the like of whom we shall look for in vain in the present generation. Born at Kingston, Old Colony, August 24, 1801, he graduated from Brown University in 1821, and received the degree of Doctor of Medicine from Bowdoin College in 1824. From this time forth he became a resident of this State, practising his profession, Principal of the Gardiner Lyceum, Professor of Natural Science in Waterville College, Editor of the *Maine Farmer* for more than thirty years, a member of the Legislature for five consecutive years, conducting scientific surveys on behalf of the State, first Secretary of the Board of Agriculture and of the State Agricultural Society, Vice President of the National and the New England Agricultural Societies, and member of various historical and scientific societies, several of which positions he filled at the time of his death, and in all the posts of honor to which he was elevated discharging his duties with a faithfulness and ability that strengthened the estimation in which he was held by the public.

The character of his mind was suggestive rather than practical. While laying down premises and drawing conclusions that others

would seize upon and work out successfully, he rarely availed himself in practice of the benefits thus arising from his own labors. His power of generalization was greater than is possessed by many men, even of his attainments. He comprehended at a glance, and was quick to perceive the relations the parts bore to each other. The minutest details were entered into and understood as well as the more generous principles, and he was thus able to comprehend fully whatever came under his observation. He saw things for himself; he saw things as others looked upon them, and having this distinctness of conception combined with a clearness of expression that left no point in doubt, he was both the instructor of the humblest and the wisest. Herein was the secret of the power he exercised over those who came within the sphere of his influence, whether he discoursed to them in the popular assembly, or from the editorial chair.

He thirsted for knowledge continually; not the knowledge of books, but the knowledge of nature. He had no desire to revel in classic lore, no taste for the subtleties of mathematical calculation, but when he opened the book of nature, his whole soul was absorbed in its mysteries, and he delved among its treasures as the miner working on golden sands dreams of boundless wealth. He let the dead past sleep with the slumbering ages of by-gone centuries, waiting its own resurrection, he lived with the living present, anticipating the future, sufficiently to stay no march of progress already indicated by the shadow of coming events. With him right was right, no matter who opposed, and his fearless soul dared to defend it. His own consciousness of duty performed was more to him than the consciousness of the world's applause. The cause of humanity, the rights of the oppressed, the defence of government, and loyalty to country in darkest hours, found in him a ready defender, and the patriotic utterances of his heart were akin to the devotion of the fathers.

He was the true conservator of the industrial and domestic interests of Maine, and watched their progress and development with all the solicitude and care of one whose vital concerns were at stake. To the farmers whom he so often met in the midst of his labors, he was emphatically a father, and in the many homes in his own and other States lived a numerous family. When he went forth he moved as a patriarch of old among his children, their herds and their flocks; all were ready to bid him welcome, and thousands rose up to do him reverence.

From a neighboring province comes a most fitting and appropriate recognition of his services in the great cause to which his life was devoted, in a valuable contribution to the monument the people are voluntarily dedicating to his memory.

His sympathies were emphatically with the masses. Man was his brother, and in whatever state or condition he met him he was ever ready to extend the right hand of fellowship to his equals and comrades in life, or relieve the wants of the mendicant that sought his charity. He was thought sometimes to be open to censure in this respect, so forgetful would he be of the duties and obligations he owed to himself and family, that the needy should not go away empty from his door; but it was all of the generous promptings of his own heart, and the world forgives it in him now he is gone.

He lived not to himself, nor for himself. While he lived in the present, he lived to the future also; two lives blended in one, that the harmony of that life might be the more complete. With him the question was never considered whether he was to gain or lose by the transaction, but would it be productive of individual or public good? And having settled this point in his own mind, he entered into the execution of it with all the zest of a disciple of mammon, and the enthusiasm of a votary of pleasure.

He was a remarkably public-spirited man; he was made for the public, not for himself; had no interest, seemingly, in himself. His own identity was lost in that of others, to the entire exclusion of personal preferences, if he had any. His idea seemed to be, judging from the tenor of his life, that humanity had a common right in the bestowals of Providence, and whether they chose to avail themselves of that right or not, it mattered not to him, he admitted the principle. That he had faults, men that knew him will not deny; all fail in some particular in the rule of life, and his was no exception. Great men are great in all things pertaining to themselves. If they excel in great virtues, they may likewise sink into great vices; in proportion as they excel the world's average ability in what makes them great, they may fail of doing in what makes men successful. To this latter class of great men, Dr. Holmes undoubtedly belonged. Acknowledged as a great teacher of men in things pertaining to the visible universe, yet he was not their exemplar, but had need

rather that he be taught *of men* in what were the first principles of practical life.

In his intercourse with the world he was affable, courteous, always approachable. Men came to him without restraint, and though sensible of the presence of superior intelligence, yet enjoyed a freedom of communication allowed among the commonest. He drew men to him rather than repelled them, and thus was able through a long and useful life to retain his hold on the popular heart. Honest in his convictions, he always defended the positions he assumed with a pertinacity of purpose and a vigor of intellect that made him no mean antagonist in polemic contests, and soon assured his rival that "there would be blows to take as well as blows to give." His tastes were simple, his wants were few and easily supplied, his morals were correct, his testimony believed, and his whole life in harmony with himself if not with the world; and when the great destroyer came he was stricken down, but did not fall; he rose to a higher plane of existence, to that memorial state in which men cease to admire but to revere; and the legacy he left behind became the common heritage of all.

When the act of Congress bestowing grants of land to the several States for the endowment of agricultural colleges passed, he entered into the consideration of measures whereby the State might avail itself of the benefits of the appropriation, with all the strength and ability his life had given him, centred on this one enterprise all his energies, deeming that he saw in it the consummation of his desire in the present, and the realization of his hopes for the future. He guarded every avenue of approach to its funds with the jealous care, the eagle eye of a sentinel on some lofty watch-tower, and wo to the falcon claws that presumed to clutch at the prize. The last and most distinct impression we have of Dr. Holmes is on the occasion of one of those contests for the bestowal of the gift the State has witnessed since accepting the favor, and will be recalled by many present as the first hearing before the Committee of Agriculture on the proposition from Bowdoin College, contained in the report of the Commissioners. The case had been stated, the claim set up, its advantages fully set forth, and it came the Doctor's time to reply. He arose to speak with eyebrows knit, with lips contracted, and in an analysis of the whole subject, clear and distinct as his own thought, he pointed out what he deemed would be the gross injustice done to the industrial classes if the national gift was diverted from its original

purpose by connecting with any existing college, and warming with his subject, his countenance all aglow with the fire of his soul, his eye lit up with a view of the present and visions of the vast multitudes reaching far into the future, whose champion he now was, he drew himself up to his fullest height, his whole frame thrilled through with emotion, and throwing back his head with the right arm extended, pointing to the committee, exclaimed: "and now I tell you, Mr. Chairman, that the farmers of Maine, after having desired this thing so long, and hoped for it so long, and prayed for it so long, and *waited* for it so long, are not now going to sell their birthright for a mess of pottage."

I see him now as I saw him then, one year ago to-night, standing in this hall, and the scene will ever remain a vivid picture while time and reason last. The occasion was historic and worthy the pencil of a painter, and could it be delineated with the hand of a master, would be a most fitting memorial of the closing labors of his life. The next week he was again before the committee, earnestly contending for the people's right to the independent location of the college, where he contracted a severe cold; an attack of acute pneumonia came on, and on the 9th of February his days ended in the midst of their activities. He went from the committee room to his hotel—to his home, from his home to the grave—to the grand empyrean on which his pure thoughts often dwelt, and where in his faith he expected to meet the friends who had gone before him, and there wait to be joined again to those who should follow.

Thus lived and died one of the most useful citizens, though an adopted one, the State ever had; one whose memory will long be cherished by all who knew him, and time shall hallow it in the hearts of the people. Peace be to his ashes, he rests in peace. His name and his fame belong not to us alone; they have gone forth to the world, and his eminent abilities and distinguished services have been appropriately recognized by his compeers in scientific labors and research. One who knew him intimately and well, paid this most fitting tribute to his worth while living, in this brief comparison:—"Massachusetts boasts the wit, prose, poetry and patriotism of her Dr. Holmes; the Dr. Holmes of Maine will be remembered in his works, when prose and poetry are forgotten." He needs no stately mausoleum with lofty dome, beneath which his dust shall moulder, or colossal bronze in giant

form to perpetuate his memory ; a grander symbol is his, a nobler arch is reared.

Citizens of Maine ! Would you behold his monument ? Look around you ; the unfinished temple of knowledge rises grandly before you ; the nations stand on its broad platforms, all tribes and kindreds and tongues mingle in its consecrated halls. Build it as he builded, till its pillared dome shall pierce the clouds, and everlasting sunlight plays around its summit ; and when the teeming millions of generations yet to be shall crowd its courts to worship at its shrine, they shall see written on a fair stone, conspicuous among earth's honored and illustrious sires, whose fame covers its walls within and without, from foundation course to topmost stone, the name of Ezekiel Holmes."

Informal meetings were held at various times during the session, at which numerous topics were taken up. In these discussions members of the legislature freely participated, and much interest was awakened. With few exceptions, the notes of those now at my command are insufficient to do justice to the speakers, and they are accordingly omitted.

During an evening thus devoted to the subject of orcharding, some facts were presented, worth preserving. The discussion was opened by Mr. Perley, late President of the Board, who remarked that orcharding was profitable in this State. In the hilly part of Maine apple-trees can be grown successfully, and an acre in orcharding will produce as much or more than any other crop. He gave the following statement of the profits of four acres of land in orcharding for the years 1864 and 1865, which was pastured with sheep :

1864.	ACCOUNT OF FIELD No. 9.	Cr.
By 350 bushels hand-picked apples, \$1.25,		\$437 50
By 115 bushels windfall apples, 50c.,		57 50
Pasturage,		10 00
		———— \$505 00
	Dr.	
To labor draining,		\$11 25
To labor grafting and pruning,		12 25
To harvesting,		49 25
To interest and tax on \$500,		40 00
		———— \$112 75
Net income, \$392 25.		

1865.

ACCOUNT OF FIELD No. 9.

By 450 bushels hand-picked apples, \$1.75,	\$787 50
By 80 bushels windfall apples, 75c.,	60 00
Pasturage,	10 00
	————— \$857 50
To labor draining,	\$34 00
To labor harvesting and pruning,	83 50
To interest and tax on \$500,	40 00
	————— \$107 50
Net income, \$750 00.	

We can get nursery trees that can be brought to bearing in eight or ten years; but to do this the orchard must be tended and cultivated as much as corn—especially when young.

The Baldwin apple—a valuable sort—is a little tender, especially when on low lands, but on high land it succeeds well. This fact has been proved in several localities and instances. An apple that shall take the place of the Baldwin in other qualities and be hardy, is much needed, but has not been found. The Baldwin is an excellent apple for transportation, as it does not bruise easily.

The apples in this State are more solid than those grown in New Jersey, and bear shipping and transportation better. This is an advantage States in a southern latitude do not possess. Many apples are shipped annually from Portland to the West Indies. This year apples from Nova Scotia have been brought into this State in considerable quantities.

He believed the soil along the seaboard was not adapted to apple trees; they did not succeed as in the interior of the State. Considered the Baldwin the best apple for profit—next the Rhode Island Greening. The latter has a reputation, and will always sell. Thought Maine as well adapted to pears as Massachusetts. Can give no satisfactory reason for causes of failure of the past two years. Cannot believe that the prevailing cold east winds in spring cause the failure of the fruit crop, for we have such winds every year, and fruit is made to grow in just such winds. Alluding to the severe seasons of 1856 and '57, he said that in February we had weather such as is usual in April or May; the trees started into growth, and the severe cold following killed the newly formed alburnum, and in spring the starting of the trees peeled off the bark and the trees were killed. These severe seasons had not damped his courage in the culture of fruit trees, for the same might not happen again for one hundred years.

Rev. Mr. Dike, of Bath, remarked that he resided on the sea shore. In his vicinity fruit culture is diminishing. He had, in his orchard of old trees, tried various modes of culture. The subsoil is a stiff clay, and he had underdrained with a view of improving the character of the orchard. The drains were run close by rows of trees, and with most satisfactory results. He believed we could raise pears successfully in Maine, and had found on the stiff soil in his locality underdraining necessary to success. The same was true in regard to cherries.

As a good eating apple, he would put many kinds before the Baldwin, although he agreed with the remark of Mr. Perley as to its market qualities.

Mr. Prince made some remarks, giving an account of his experience in orcharding, and believed that it can be made the most remunerative branch of farming in Maine, but it must be attended to, and great care must be exercised over the trees to keep them healthy and guard them from the borer, &c. Had succeeded well with the Bartlett pear, which had proved sufficiently hardy. Thought it would be a good plan for agricultural societies to encourage the planting of nurseries. In regard to planting trees, preferred to set in fall instead of spring. Sets his apple trees thirty feet apart.

Mr. Hills, of Northport, stated that in setting out a new orchard, he first drained his land, and the trees nearest the drains are the healthiest and bear the best of any in the orchard. Cultivates pears as easily as apples, and the trees are healthier. Soil loamy, with stiff clay subsoil. Has been very little troubled with the borer. Grows several varieties of pears. The Madaline succeeds well, and grows and bears well. In his locality trees with the same care will do as well as in any part of the State. Uses rockweed for a mulch with excellent results. Trees thus mulched were not infested with caterpillars as were those not having the rockweed about them. It is also a preventive against the borer. Thought the Flemish Beauty one of the best pears grown, and had sold his for \$5 per bushel the past summer.

Mr. Bigelow remarked that in his section of Somerset county the apple trees were as bare in June last as they are in December, on account of the ravages of the caterpillars. Acres and acres of forest growth were also completely stripped of their foliage. If some sure remedy for this pest could be found out, it would be of untold benefit to the State.

Mr. French stated that he had a tree bearing apples called the "Grindstone," (which originated in South Hadley, Mass.,) growing by the side of a Golden Russet tree. The branches of the former extended into the Russet, and on one twig of the Russet were three apples, two of which were Russets, the other being to all appearance a "Grindstone." Specimens of these apples were exhibited, and gave evidence of a curious freak of nature in the production of fruit.

Another evening was devoted to the question, "What is the preferable season of the year for preparing land and manuring for hoed crops?"

Several gentlemen were heard with interest in detailing facts of their experience, going to show that autumn presented greater advantages for this purpose than the farmers of Maine had been accustomed to avail themselves of. Phineas Barnes, Esq., of Portland, spoke at considerable length. The views presented by him were the same as he urged upon the farmers of Cumberland in an unwritten address, at their exhibition the year previous. Kindly acceding to the request of the Board, he has consented to write out his remarks, and they may be looked for in subsequent pages of this volume—and are commended to careful perusal.

The final adjournment of the session was on January 30th.

ON THE CULTIVATION OF THE HOP.

As a general rule, the gains of agriculture are moderate and sure; but the rule is not without exceptions. The Hop is generally reputed to be one of the most uncertain of agricultural crops, in respect to the pecuniary returns which it yields. This uncertainty has been due mainly to two causes—first, the enemies which the plant has to encounter, and which reduce the yield; and secondly, to the excessive fluctuation in prices. The latter has been largely occasioned by the fact that no means have yet been successfully adopted on the large scale to retain the crop of abundant seasons for use in subsequent years of scarcity without serious loss of quality, and consequently of market value. There seems to be reason to believe that the difficulty may be overcome, as I shall presently have occasion to show, and that in future fluctuations in price may be less than heretofore.

The result of personal inquiry among the growers in Maine, has led to the belief that the crops during twenty to thirty years past have been much more uniform in this State than they have been reported to be in other sections; no serious hindrance to successful culture having been encountered except the aphid, or louse, which has been troublesome for a few years past. A very intelligent and skilful cultivator of hops for more than twenty years, Mr. Noah Jones of China, and who has made the hop the specialty of his farming operations, informed me that during his experience there had been but one season when it proved a failure, and that, as a whole, the culture was exceedingly satisfactory, the best paying branch of farming which he knew of.

The hop has never been grown very extensively in Maine, yet sufficiently, it would seem, to give tolerable data from which to judge of its adaptation to the climate and other conditions which prevail here, and of the success of the crop so far as it depends on these conditions.

According to the census returns of 1850, the amount grown in Maine was then 40,120 lbs., of which 31,417 lbs. were grown in Oxford county. In 1860 the crop is stated to be 102,987 lbs., of which 85,000 were grown in Oxford county, and 11,000 in

Franklin county. The total amount grown in the United States is reported to be 3,497,029 lbs. in 1850, and in 1860 10,991,996 lbs., of which New York produced 9,671,931 lbs., Vermont ranking next, 638,677, Wisconsin 135,587, New Hampshire 130,428, and Massachusetts 111,301 lbs.,—five States only raising more than Maine. The increase of production since 1860 is believed to be even more rapid than in any previous period, and the demand has more than kept pace with the production, the price being greatly enhanced, and appearing likely to continue at a high figure.

The German element in the population of the United States is a large and increasing one, and many of foreign birth deem their beer as needful as their bread, and not a few born among us tend to the same way of thinking. With the present and prospective demand for malt liquors, the probability of a corresponding demand for hops at highly remunerative prices seems very strong. Whether this large consumption of ale and beer consists with benefit to the individual consumers and to the public at large is not a point here in question. We are now simply considering its mercantile aspect, a question of demand and supply of an agricultural product. Those who conscientiously prefer to discourage the consumption of malt liquors will let beer drinking and hop growing alone. And the latter may also be let alone by those who are content with moderate and surer compensation for their labor in all seasons. Should the aphid and other hindrances become as serious here as they are reported elsewhere, the culture of the hop will be attended with some hazard, and, on the whole, it is rather to those who, living by husbandry and possessing natural advantages for its prosecution, are impatient of the slow gains of its more common branches, and envious of the occasional success of speculators, are willing to put something at risk for large possible gains, that hop culture is specially commended. The risk assumed is much in the nature of an insurance upon the weather, and more against the depredations of enemies; and it may result in a return of somewhere, and almost anywhere, between fifty cents and five dollars per day for the labor expended; or from fifty to five hundred dollars per acre for the crop, and perhaps between even less and more.*

* Mr. M. A. Mason, of Bethel, showed me an acre in its first year of bearing, which was then being picked, (near the end of August,) from which he confidently expected to obtain, at least, a ton of choice quality, worth at present rates something over a thousand dollars.

The successful prosecution of hop culture is not to be expected without the investment of a considerably larger amount of capital per acre than Maine farmers are generally accustomed to employ, and the needful outlay for hop house, kiln, press, &c., renders it expedient that the area under cultivation should be of corresponding extent. Less than three or four acres would rarely pay well enough, and if more than double that surface were cultivated, there might be difficulty, in many of our towns, to secure the necessary labor in picking, curing, &c. On the whole, we would not recommend any to begin with more than three or four acres at the outset, to be enlarged as results may warrant; nor without capital enough to carry it on easily and well, and also to bear the loss of one crop without serious embarrassment.

To an inconsiderable extent the hop is used medicinally, but the plant would not be grown as a field crop except for the properties it possesses as an important agent in the brewing of ale, beer or porter, which it tends to preserve, and to which it imparts a peculiar flavor. When first largely used for this purpose in Great Britain, a strong prejudice was raised against it, and Parliament was petitioned to enact laws against its employment, because, as was alleged, it was "a wicked weed that would spoil the taste of the drink and endanger the people."

The parts of the hop which enter into the composition of the beer are the seeds and the lupulin, or the yellow glutinous matter which attaches near the seed. The latter is the most important and active portion, possessing an intensely bitter taste, and a peculiar, agreeable aromatic odor.

It is because its aroma is so volatile that it is necessary to pack closely as soon as the hops are dried; and with the utmost care the aroma nearly all escapes by the time another crop is grown, so that the value of hops a year old is trifling compared with new ones, which last are indispensable for the finer qualities of malt liquors. Numerous attempts have been made to prepare a concentrated extract from fresh hops, which could be kept long without deterioration, so that the product of plentiful years could be made available in seasons when the crop was small, but such attempts were generally entire failures.

A few years ago, Prof. S. R. Percy, of New York, experimented upon the subject, and I have by me now a specimen of a lot which I saw him make from the crop of 1863, which has been kept now for more than two years in my office with no apparent injury or

deterioration of flavor. Should this or any similar attempt prove successful, as now seems very probable, it would go far towards preventing the excessive fluctuations in prices which have hitherto prevailed.*

The *humulus lupulus* or common hop, is a coarse, twining plant, with rough, angular and hollow stems; the leaves rough, heart-shaped, lobed and serrated. The male and female flowers are distinct and grow on separate plants. The male flowers grow in loose branching panicles, the female flowers are close together in scaly cones, or, in what are called grape hops, in clusters. When grown from seed, a large proportion of the plants are males. This, however, is only done to procure new varieties, and a very small proportion of such would probably be worth cultivation, as they vary as much from the parents as apples, and the seedlings are mostly quite inferior. Male plants are useful to impregnate the flowers and secure greater fertility, but for this purpose one in twenty or even fifty is quite sufficient.

SOIL.—Hops naturally prefer a rich, strong loam. As a general rule, such soil as Indian corn succeeds well upon will grow good hops, though probably one rather stiffer would yield a larger quantity. The extent to which hops exhaust the soil is a disputed point. Most foreign writers call it a highly exhausting crop, as perhaps may be indicated by the name *lupulus*, signifying a little wolf. Growers in the United States generally do not so consider it. Mr. Colman, in one of his reports on the agriculture of Massachusetts, after an examination of the subject and consultation with many growers, says, "the crop exhausts the soil less than almost any crop grown." How this can be is not clear, unless, like the Jerusalem artichoke, it possesses the power to procure its mineral constituents from mere soil without much aid from manure.

According to careful analysis by Prof. Way of a specimen of hops procured from a field bearing a very large crop, (2240 lbs. to the acre,) there were removed from one acre of the field, of potash 54 lbs. in the hops, 57 lbs. in the leaves, and 23 lbs. in the bines; and of phosphoric acid 30 lbs. in the hops, 40 lbs. in the leaves, and 15 lbs. in the bine. Whatever may be the exact truth on this matter, two points are universally conceded; first, that the hop requires and will pay for liberal manuring, and

* It is said that a concentrated extract of malt and hops is successfully manufactured on a large scale at Rochester, New York.

second, that after successive croppings for a term of years with hops, the land having been well treated, good crops of grain, hay, &c., can be obtained for another term of years with little or no additional manure. To keep a hop garden in productive and profitable condition, an annual or semi-annual application of manure should be made. A few shovels of good compost to each hill, applied in the fall, serve the double purpose of fertilization and of protection to the roots. Various substances are used for top-dressing, which are usually applied early in spring. The best of these are wood ashes, bone dust and superphosphate of lime; and it is recommended by the most successful growers that these be used alternately, that is to say, that one of them be applied one year, and one of the others in each of the two succeeding years.

No definite term of years can be given as the best during which to continue the cultivation of the hop on the same land. This depends much on its original degree of fertility in both soil and subsoil, also on the degree in which it is exposed to damage in the roots in winter, by lack of covering with snow or other causes. In practice I have generally found the term considerably shorter in Maine than in other States, although in one instance a field was pointed out which had been in continuous cultivation for about thirty years, and cases are not unusual of half that time.

When grown in a congenial soil and well cared for, the durability of the plant is very great. In some cases they have flourished for upwards of a hundred years, and it is asserted that in Mr. Paine's celebrated "Heart Gardens" they have been continuously grown ever since the culture of the hop was introduced into England—say three hundred years or more.

FORMING OF PLANTATIONS.—The site of the hop field having been decided upon with reference to character of soil, security against high winds, and other desirable conditions, the land is to be prepared very much as for Indian corn, except that it needs to be more heavily manured than are most of our corn fields, and it should be not only plowed but subsoiled. If not dry enough naturally, underdraining is very important. The manure should be spread and well incorporated *near the surface*, deep manuring being profitable. The distance between the hills may be seven or eight feet; the first giving, if in squares, 889 hills to the acre, or, if planted in triangles, 1025 hills. At eight feet apart, and in squares, we have 680 hills per acre. It is usual, and in fact almost universal practice, to plant cuttings of roots, two to five to

each hill. Two plants only are required to form the hill, and if the cuttings are good and carefully planted, and the season favorable, only two pieces of root need to be used, but often three, four or five are planted. A surer method, and one considerably practised in England, is to plant what are called "bedded sets," that is, to have the cuttings grown one year in a nursery upon good soil before permanent planting in the hop field. Two of these "sets" only are used, and failures even in dry seasons are very rare. The first season of planting, Indian corn, potatoes or other hoed crops may also be planted on the ground in the vacant spaces, as the hops need to occupy not more than a quarter or third of the land.

In the spring of the second year the poles are set, and from this time no other crop nor weeds should be grown with it.

Two poles generally go to each hill, and two of the strongest and thriftiest vines to each pole. These when about two feet high are secured by some slight fastening.

The furnishing and replenishing of hop fields with poles is a considerable item in the expense of cultivation. In this regard, however, the grower in Maine has a marked advantage over the one in England or in New York. Their length should be from sixteen to twenty-two feet—depending on the richness and strength of the soil, and the natural degree of vigor of the variety which is grown. Cedar, larch, (often called hachmetac,) and spruce are preferred, and with care will last eight or ten years. Elasticity in a hop pole is a quality much preferable to stiffness. They should be set firmly in the grounds so as to resist the winds. These being injurious to the plant in other ways than by blowing down poles, it is highly important, other things being equal, to select a locality well sheltered by some natural provision, as by hills or forest growth.

Latterly, a horizontal method of training has obtained in some sections, for which it is understood a patent is claimed, and is by some highly commended. F. W. Collins, of Rochester, N. Y., (whether interested in the patent claim or not I do not know,) in a recent communication to the Farmers Club connected with the American Institute, speaks of it as follows :

"The roots should be set eight feet apart each way. A free exposure to the sun and air is as necessary to the hop vine as to the grape. The common plan of training a mass of hops up a 20 to 30 foot pole is as detrimental to the perfect development of the

fruit as would be the same method with the grape vine. The fruit-bearing arms, few of which are thrown out less than seven feet from the ground, need to hang freely in the air to do well. In the horizontal method of training hops four vines are allowed to run up a stake seven feet in height, when they are separated and trained upon twines stretched across the yard in both directions, by which means the fruit-bearing arms, hanging freely from the twines, receive all the light, heat and air requisite to ripen the fruit and prepare it for harvest several days earlier than hops grown by their side upon long poles. The twine used may be that known as wool twine or broom-makers' twine, either flax or hemp. The best way is for each hop-grower to raise a bed of flax and hire his twine spun. A man or boy upon horseback, with a basket of twine fastened to a belt, should put the twine upon the stakes. Fastening it securely to the strong outside stake, he should ride along the row, winding it once around each stake, at the top, to the end of the row, where it is again secured. The same process is repeated for each row in both directions, and thus a network of twine is spread over the yard seven feet above the ground. Occasionally the hop-grower should ride through the yard and place the vines upon the strings. Standing with his back to the stake he should place the vine over the string with his right hand, and receive it underneath with his left—to let it grow with the sun, and it will show no tendency to leave the twine.

The stakes may be either small round, split, or sawed, except the outside rows, which should be as strong as ordinary hop poles. They should be cut eight feet in length, and set one foot in the ground. The outside rows of stakes in each direction should be placed one row outside of the outer row of hop plants; this will prevent any crowding in the outer rows of the yard, and add much to the neatness of its appearance. Indeed, I do not know of anything more beautiful in the line of agriculture, than a hop yard trained as thoroughly as it should be in this manner. That it is the most profitable crop a farmer can raise does not prevent its also being the most attractive to an artistic eye.

The saving in the expense of training a yard in this manner is worthy of note. By the old method two poles, from 15 to 30 feet in length, were necessary to each hill; by the horizontal method, one stake eight feet in length, with 17 feet of twine, is all that is required. Seven hundred stakes, eight feet in length, take the place of 1400 expensive hop poles. Prices vary in different portions of the country, and yet the relative prices remain the same.

In picking hops the universal practice has been to cut off the vine, raise the pole, and carry it with the vines to the box, leaving the roots to bleed freely. By this means the roots are all greatly weakened, and the stronger and most vigorous plants, if they survive the trial, prove the weakest plants the ensuing season.

Canada thistles would scarcely survive the treatment in this respect, which has most thoughtlessly been practiced upon hop vines. By using stakes and twine the necessity for cutting off the vine at the root is obviated. The box-tender, by the aid of a stool, if necessary, can reach every arm and cut it from the vine without injuring the vine that is left, and this secures a strong, vigorous plant for another year."

ENEMIES.—In other sections the hop is liable to injury from a variety of causes, which are either unknown here or operate to so small extent as scarcely to affect results. As before remarked the only serious obstacle thus far encountered by growers in Maine is from the ravages of the hop louse, so called. It is not properly a louse at all, but an aphid—one of a numerous family to which many plants are subject—a little green, semi-transparent insect, the females wingless and the males winged. They operate by sucking the juices of the plant. They are formidable from their numbers. Being endowed with most marvellous fecundity they increase with unparalleled rapidity—each female producing a dozen or twenty daily, and these in turn very soon issuing progeny with like dispatch. If no hindrance to their increase occurs, loss of vitality rapidly ensues, and a blight to vine and leaves and prospect of crop is the result. Fortunately it has natural enemies which oftentimes hold it in check, and sometimes cause its sudden and mysterious disappearance. Another insect, the lady bug, or lady bird, is most efficient in this work; and sometimes their entire disappearance follows some peculiar condition of the atmosphere, the nature or causes of which are very imperfectly or not at all understood, and are not under our control. As for remedial measures, so far as I can learn, the same which are effective with the aphides which trouble other plants are equally so with these. Every gardener knows that the aphid cannot abide tobacco either in smoke or in decoction, and also that a solution of Whale Oil Soap* very quickly destroys them.

*The Whale Oil Soap here referred to is not a soap made from whale oil and for this use, but it is a side product of the purification of crude whale oil. This last is treated

I would recommend the keeping of a sharp outlook for the aphid and on its first appearance, the application by means of a syringe, of a decoction of tobacco, in which is also dissolved a portion of whale oil soap, prepared somewhat as follows:—Take of coarse cheap tobacco, one pound, and steep it in two gallons of boiling water until its strength is extracted, and then add a pound of whale oil soap; when this is thoroughly dissolved add five gallons of water—perhaps it might prove strong enough if eight gallons were added. In many places, refuse stems might be procured of the tobacconists very cheap, which would answer equally well by using double or treble the quantity. The application should be repeated until they disappear—because if all the living ones are killed to-day there may be a new crop hatched out to-morrow or next day. The trouble is not so much to kill or destroy a few thousands or scores of thousands as to reach the whole number.

Some very good cultivators think it quite as well not to attempt any remedial measures whatever, but to let them alone and take the chance of some providential interposition in their behalf, or of the loss of the crop.

In order to give the views of some of the best hop-growers as recently expressed on various points connected with their cultivation, I subjoin herewith an essay by John P. Smith of Worcester, England, which received the prize offered by the Royal Agricultural Society, and was recently published in their Journal:

“The hop thrives best in moderately warm climates, and this may account for Kent and Sussex, two of the most southerly counties, being selected for its cultivation, and producing a very large proportion of the annual yield of the kingdom. Worcester and Hereford stand next in importance, and yield about one-eleventh of the yearly average growth. Farnham and its neighborhood stand next as to quantity. The district known as the North Clays, in Nottinghamshire, formerly grew a fair quantity of good hops, but of late years the plantations have been much re-

with alkali which combines with matters which it is needful to extract in order to render the oil fit for the common uses to which it is put. It also combines with a portion of the oil, and the product—sometimes light colored and tolerably clean and sometimes dark, rank and offensive is what is sold at agricultural warehouses, mostly for horticultural uses, as Whale Oil Soap, and is the most reliable application known for the riddance of numerous insects injurious to vegetation. One pound is enough to dissolve in from three to five gallons of water, according to the strength of the soap and to the toughness of the insect enemy and his powers of resistance.

duced; the same remark applies to the district around Stow Market in Suffolk, and also to the county of Essex.

A southeastern aspect affords, in my opinion, the best situation for a hop-garden, and if it be well protected from the west winds that prevail during the autumn, so much the better, as great mischief is often done by wind. Due care must be taken to adapt the planting to the peculiarities of the soil. The Golding hop will be found to succeed best on dry friable soil, with a gravelly or rocky subsoil, such as we find in the hilly districts of Middle and East Kent, whilst Mathon White, and Grapes, prefer a stronger soil, approaching to clay; the former variety flourishes on the deep land in the vale of the Teme, and the latter in the Weald of Kent and Sussex, which is mostly strong clay soil. Another variety, Cooper's White, a good sort, but delicate, is best suited for good strong *loam*. There are besides several kinds of red hops that are not approved by the brewer, and, in my opinion, cannot too soon become extinct; they are mostly grown on the poor lands of Herefordshire. Many other kinds are grown in Kent and Sussex, viz., Golden Tips, Pheasants, Golden Grapes, White Bines, Grapes, Jones's, &c., and a sort introduced some few years since by Mr. Colegate, and known by his name. This is a hardy variety and heavy cropper, but subject to blight, and repudiated by the brewer as a rank bad hop, yielding a most unpleasant flavor to the beer. A young planter should avoid this variety if he wishes to obtain a good character for his growth.*

We will now assume that a suitable field—one that has been thoroughly drained—has been selected, and the preference given to an old piece of turf; in that case I would recommend that the land be trenched two spits deep, the top spit being kept uppermost, with the turf downwards. When the digging is finished, the surface should be harrowed, and rolled down as fine and level as possible, ready for setting out. The planter must next determine on the arrangement of the rows, whether on the angle or the square, and the distance from plant to plant. The usual method

* Let me here give a caution against relying too confidently upon what may be said of the comparative merits of varieties when grown elsewhere. It is true that but little proof has yet been had, in this State, of the various esteemed sorts grown in England, and much more is needed; but what there has been shows that it is much safer and better to rely upon the results of experience here rather than upon reports from abroad. It is very desirable that all the most promising sorts should have a thorough trial here, but the *trial* should be on a *limited scale*, and continued until its merits or demerits are clearly established.—A. L. G.

in Worcestershire and Herefordshire is to lay out the rows 7 or 8 feet apart, and set the plants $2\frac{1}{2}$ to 3 feet distant in the rows. If your land be good, and likely to be highly farmed, a uniform distance of 7 feet square may be recommended; good cultivation will ensure a large quantity of bine, and a sufficient quantity of sun to bring the fruit to perfection, whilst at this distance you have more room to cultivate without injuring the bines.

If this plan is adopted, you must prepare 889 small sticks, a foot to 18 inches long, for every acre, that being the number of hills which an acre will take at 7 feet square. First square your field, and then commence in the centre, working right and left; you will thus be more likely to be correct than if you begin on one side.

Your field being truly set out, you may prepare for planting; if you plant bedded or yearling sets (which are far preferable to cuttings), a man should take a spade and remove the soil from two sides of the stick, the opening being 2 inches wide at the top, and 4 to 5 inches at the bottom, which should be deep enough to let the roots lie straight. Two strong-bedded roots are sufficient for a hill, but if not strong, 3 may be better. Care should be taken to bring the head of each root as close to the stick as possible, some good fine soil should then be put to the roots, and made firm with the foot. For a plantation of 20 acres, with suitable oasts and cooling rooms to dry and cool the crop in one month, for a first-class growth, the following varieties are recommended:— 5 acres of Cooper's White, or 3 Coopers and 2 Jones's; 6 acres Mathons; 6 or 7 acres Goldings, and 2 or 3 Grapes; but this distribution of sorts must, in a measure, be governed by the quality of the land, that variety being most largely planted which is best suited to the soil. The crop ought to be secured in three weeks, or certainly not more than a month; and it is most important to have an early sort, such as Cooper's White, or Jones's, to commence with, then will follow your Mathons, then the Goldings, and lastly, the Grapes, a hardy sort, which will hang well for the last picking. Jones's are serviceable to use up old poles. The writer has seen a ton an acre on 7-foot poles. If, as is mostly the case in Sussex, one variety only be planted, you must begin to pick before your hops are ripe, or have a considerable proportion brown before you can finish.

If the planter should determine on a piece of old tillage, I recommend him to plough 10 inches, and subsoil as deep as he can; the

ploughing completed, he will proceed the same as if it had been a meadow, with this exception, that after the sticks are truly set, he should dig holes 2 feet in diameter, and 2 feet deep, placing the top or best soil on one side, and the bottom soil on the other side of the hole obliquely, so that the heaps may not interfere with replacing the sticks when the holes are refilled. Good dung or rather a rich compost should be wheeled on, and a fork or shovelful mixed with the *best soil* after the hole has been half filled with good soil from the surface; this being finished, you must readjust your sticks, and when your soil has had time to settle, you may proceed to plant in the manner before described. On no account bury your manure. Should the weather be favorable, and your roots get a start, they will require two poles to each hill 6 to 7 feet long, and if the season be good, a crop of 2 or 3 cwt. an acre may be grown; if cuttings are planted you lose a year.

Potatoes and mangold are frequently planted between the rows, and an ox-cabbage between each hill; this will, by many, be condemned, but much depends on the condition of the land and the disposition of the planter to make compensation to the soil for what has been taken out by the green crops by a dressing of manure, which must be applied in the winter and dug in. Turnips may be planted if the land admits of their being fed off; and this plan, if oil-cake or corn be given, will manure the land at a cheap rate, greatly to the benefit of the hops.

February and March are the months best suited for throwing down and cutting, the land being first ploughed or dug. If the plough is used, a slip from 12 to 15 inches wide is left. Your men will commence digging these slips, cleaning the hills, and cutting the roots; this finished, your poles must be spread, and your pile rows ploughed, dug, and cut the same as the rest.

In the course of a fortnight or three weeks the bines will begin to appear, when no time should be lost in pitching the poles, which should be set by line to ensure regularity; the poles for this season, if the roots are strong, may be from 10 to 12 feet. The next operation is tying, but the tyer should first go over and take out the rank hollow bines; these should, on no account, be put up the poles, since they have a tendency to grow to an extravagant quantity of bine, without bearing a proportionate quantity of fruit—the next and less vigorous bines will be found far more fruitful. Some planters put three bines up each pole; if four poles are put to a hill, which is the custom at 7 feet square, two

bines will be found sufficient; if three poles, put two twos and a three. The tyers are paid by the acre, and go over the hills three or four times until the poles are furnished, when all superfluous bines and weeds are pulled out. This completes the tying, except by ladder, which is paid for extra. The men now follow, dig round the hills, and put a shovelful of soil into each hill—this prevents new bines from springing up.

Different varieties require different sized poles. On no account overpole, as much injury has resulted from it; 14-foot poles are long enough for any variety except Goldings, and for them I would not, as a rule, exceed 15 feet. Jones' will do well with 8 feet; Grapes 10 to 12; Coopers 12, and Mathons 12 to 14 feet, according to cultivation and quality of land. When your hops are tied, no time should be lost in working them with the nidget or scuffle, followed by the harrow—this should be done both ways. All working should be finished by the 1st of July, certainly by the 10th; considerable mischief is often done by working too late, unless in years of blight. When you have vermin on your bines, do nothing to your land—leave them until the vermin disappears—then go in with all your strength, nidget both ways, and do all you can to put fresh vigor into the plant. Some planters manure in the winter, and some both winter and summer; but this may be carried too far for quality, and produce mould. The plan adopted in summer is to wheel in good dung or compost, take the soil from round the hills, put in the manure, and dig it in; or spread the compost (which I prefer) round the hills on the surface and dig in. All that is necessary after is to use your nidget, and harrow both ways, taking care not to pull up the dung. This should complete the work, unless hoeing is required to keep down annuals.

Picking commences in early seasons from the 1st to the 8th of September; in late ones, from the 15th to the 20th. Before it begins, due provision should be made, and everything got in readiness; cokes may be sent for in July and August, and a sufficient number of pickers engaged to keep your kilns or oasts properly at work. In this you must be governed by the size of the hops. Different plans are adopted in picking and measuring; some measure by tally, others by book and cards representing the number of each crib or bin. I have found it best to put two cribs into the centre of 100 hills; this is called a "house," and the cribs re-

main until the work is finished. The poles will be in two heaps at either end of the cribs, and in the proper place for stripping and piling. If this is strictly carried out, much trouble is saved in piling the poles. When a sufficient number of sacks are picked to load one kiln (and this should be done before breakfast), they should be taken and put on the oast, and so on until all your kilns or oasts are loaded; and it should be so managed that hops enough be picked to reload the kilns at night.

Hop-drying requires great attention, and the *slower*, in reason, they are dried, the better. They should be dried by a current of hot air being continuously passed through them, and not by combustion. Many say they can dry hops in seven or eight hours; rely on it, it is better to take twelve, and let your heat not exceed 112 to 115 degrees. When the hops are sufficiently dried, the fire should be raked or allowed to go down, the hops remaining on the kiln until they become soft, which will prevent their breaking on being removed to the cooling-room. These hops will be fit to be bagged the next day, and with a proper staff this should be carried out through the picking.

Poles are a heavy item in the cost of hop-cultivation, and should be carefully husbanded. Their wearing value may be *doubled* by pickling $2\frac{1}{2}$ feet at the sharpened end with creosote. A tank for the purpose must be erected of size in proportion to the plantation. By the application of creosote, soft wood, such as that of the willow, &c., becomes hardened, and equal to ash or other more durable sorts.

The writer has a plantation of 75 acres, and a tank 12 feet long by 5 wide, and $3\frac{1}{2}$ feet deep. This tank will hold 1000 best poles put to stand up. The tank must be filled with creosote within 8 inches of the top when the poles are in, when water fully 2 inches deep must be added to prevent evaporation. The tank should boil slowly twenty-four hours, when the poles may be removed and the tank refilled. Care must be taken that the tank does not boil over, as creosote is most inflammable and may take fire. I am so satisfied as to the value of creosoting poles that I never intend to put a new pole into my ground without its aid. If poles were pickled one year under another, and stored in a stack till dry, they would be found to last far longer than if used in a green state.

The hop-plant has a variety of enemies; on the first appearance of the bine it is frequently attacked by a *flea*, which checks its growth, and makes it look scrubby and unhealthy, but never destroys the crop. Wireworms are a great pest; the best plan to

get rid of them is to cut a potato in half, and place it close on either side the root an inch below the surface; the potato lures the worm, and, if taken up every other morning for a fortnight, enables you to take a great quantity; I have known of a dozen being taken from one root. The greatest enemy is the *aphis*, and I regret to say that on the most important subject of its history we are as ignorant as our forefathers; we go to bed leaving our garden free, and next morning we find *aphides*—from one to ten or twenty—on a small leaf, which in the course of a week have increased to countless myriads. These pests are followed by nits and lice, which some seasons multiply so rapidly as to destroy the bine and the planter's prospects. I would here repeat the recommendation which I have already given to the planter, not to work his hops when in a state of blight. When closely watching the blights of 1860, '61, and '62, I have observed that in all cases where the land was best tilled, manured, and cared for, the blight remained until too late in the season for the chance of a crop; on the other hand, where nothing was done, but weeds were suffered to grow nearly half-way up the poles, the bine became yellow and clean, and the result was a fair sprinkling of hops; in such ground, the vermin had left the hop for want of sap and taken to the weeds.

Of late years a machine has been used to pack the hops, which is very useful when there is a very large crop, as it enables you to pack your hops much sooner. Treading up is preferable, if care be taken to have the hops in a fit state not to break under the foot; if allowed to become *too* cool they are hard and lumpy in the sample, and are termed *cold*. A master's attention to the state of his hops before bagging is most necessary to good management. Hops are picked in Worcestershire and Herefordshire far more free from leaves than in Kent or Sussex. They should be sent, if possible, to the oast without a leaf, dried slowly, taken off the kiln in a *soft*, not a brittle state, and trod into the pocket as soon as sufficiently cool; they do not then break under the foot. In Kent and Sussex hops are dried in a variety of ways, and with several kinds of fuel. In oasts on the Cockle principle anything may be used, and a considerable quantity of sulphur is required; but on the open fire principle Welsh coal and coke is used, and a small quantity of sulphur.

The cokes we get from Abberly and Pensax, in Worcestershire, are highly charged with sulphur, which will account for so little being added in these counties. Its only value is to give brilliancy

to the sample, and, if used in excess, brewers object to it as affecting the fermentation of their worts.

It has been the practice in Worcestershire and Herefordshire to make eight sacks out of one piece of cloth of 36 yards, and the weight of the pockets when filled run from 1 cwt. 1 qr. to 1 cwt. 2 qrs. It is my practice to make seven sacks from a piece, and I am thereby enabled to get 1 cwt. 2 qrs. to 1 cwt. 3 qrs. into a pocket, and I would respectfully recommend my brother planters to do the same. A heavy pocket has many advantages over a light one; you pay less for weighing, portorage, and warehouse rent, and you get your hops more quickly into consumption.

It was formerly the practice to roll, riddle, and otherwise break and spoil good hops; this silly practice is in a great measure exploded. Plant the best sorts, such as Coopers, Mathons, and Goldings, pick them clean, dry them properly, and put them into the pockets as whole as possible. By breaking the hop you lose a large quantity of the pollen, which contains *the most valuable brewing properties*.

The cost of hop cultivation per acre may be estimated as follows:—*

	£.	s.	d.
Yearly charge for poles,	5	0	0
Ploughing down,	0	10	0
Digging slips (or portion not ploughed,)	0	5	0
Cutting, picking up, and burying roots,	0	4	0
Spreading poles,	0	2	0
Pitching or setting poles,	0	12	0
Tying,	0	8	0
Nidgetting or scuffling 4 times,	1	0	0
Harrowing 4 times,	0	6	0
Forking round hills and hilling up,	0	5	0
Stripping and piling poles,	0	8	0
Resharpening broken poles,	0	3	0
Ploughing up before winter,	0	10	0
Manuring, if with dung, 20 loads per acre, at 8s.,	8	0	0
If manured in summer,	4	0	0
Ladder tying,	0	2	0
	£21	15	0
If you dig, instead of plough, 15s. per acre extra,	0	15	0
Total,	£22	10	0"

* In order to compare these prices with our present currency, let the pound sterling be reckoned at five dollars, (the shilling at twenty-five cents.) and then add to this the current premium on gold. The comparison will be suggestive of various and wide differences between culture in New England and old England.—S. L. G.

A recent anonymous writer in the New York Tribune furnishes an interesting paper on hop culture, from which we quote the following :

“The New England hop district has been much longer engaged in the cultivation of this crop than the New York. It was first enunciated among the crops of the United States in 1840, when the product of the entire country was 1,200,000 pounds. It had, however, been a market crop in New England as early as 1806, and perhaps earlier. In 1833, the product of that district was 1,136,134 pounds; in 1834, 1,174,599 pounds, and in 1836, 1,441,936 pounds. From this amount it fell off rapidly, and in 1839, the year of the census of 1840, only 452,225 pounds were raised. That district has never since regained its position in 1836, though its annual product now ranges from 600,000 to 1,000,000 pounds, about the product of some single towns in New York. In 1850, the culture had made some progress in New York, where it commenced about 1842, and 3,400,000 pounds were reported for the whole country. In 1860 it had risen to 11,000,000 pounds, and in 1862 to 16,000,000 pounds. Since that time it has fallen off, being 13,000,000 pounds in 1863, and not much over 9,000,000 pounds in 1864. In 1865 it was probably still less in quantity, though somewhat better in quality. The crop of 1866 promises to rival that of 1862, the area devoted to the crop being greatly increased, though the yield per acre may be somewhat less. The fluctuations in the quantity produced, as well as the equally remarkable variations in quality, are caused by the weather, by injuries from insects, by blights, and mildew. The crop is subject to much greater fluctuations in Great Britain, than here. From 38,000 to 52,000 acres are devoted to hops in England, about half the amount being in the county of Kent, and the yield per acre ranged within 30 years from 120 to 1,465 pounds, the yield varying sometimes in successive years over 1,100 pounds to the acre. The years 1861, 1862, and 1863, which were good years here, were years of very small crops there, and the import into Great Britain in each of those years was about equal to the entire American crop.

Having thus given some of the statistics of the hop crop in the aggregate, let us suppose that some enterprising young farmer is desirous of trying his luck in the culture of the plant, and asks our advice as to the steps he shall take. Our first inquiry would be as to his means, for some capital is required for this business.

A man with less than \$1000 had better not undertake it, and he will manage it much more profitably if he has \$5000 or \$6000. If possessed of the latter amount, the first step will be to select his place for a hop-yard. Hops will grow on good ground anywhere, but there are several advantages in selecting a place where there are other hop-growers near by; a better market, greater facility in procuring what is needful for the cultivation of the crop, and experienced tyers, grubbers and pickers, are among these. New land is better than old, and a light loam, easily drained, than a tenacious clay. The young hop-grower should be cautious in regard to buying too much land. A half-dozen acres, whether it cost much or little, will be sufficient for his first hop-yard, unless he possesses a large capital. He can cultivate more subsequently if he desires. He will need a few acres beside for his house, barn, hop-house, garden, and pasture. Let us see, now, what his outlay must be. We will suppose the place he has selected is in a farming region, somewhere in the New York hop district, at a distance of two or three miles from any considerable village. He purchases, we will say, 25 acres, including a small, but comfortable house, and a good barn, for \$2000. His land is in fair condition, and he selects a plot of six acres, which has been a sheep pasture, for the hop yard. Plowing this twice, (and he must have a pair of horses worth in the neighborhood of \$350 for this and other purposes,) he works in from 40 to 50 loads of barnyard or stable manure to the acre. The land must be rich, and barnyard manure is, perhaps, with the addition of lime or plaster of paris, the best dressing he can give it. Here will be a further outlay of at least \$300, as, buying his farm, he has no manure accumulated. His next work is to lay out his hop-yard. The roots should be set seven feet apart, each way; at least this is the general rule, though some hop growers set them at 6 feet, $6\frac{1}{2}$ feet, $7\frac{1}{2}$ feet, or 8 feet. The "rough roots," as they are called, required for setting, he can procure from some neighboring hop grower, at from 50c. to \$2 the bushel, and he will require about five bushels to the acre, or to be exact, if his hills are seven feet apart, 888 plants; the cost for roots being thus from \$15 to \$60 for the yard. It will be well, however, to procure some excess over the exact amount, as there will be gaps to be filled. Of the prevalent varieties, he will do better to select the Cluster, as it is less liable to disease than the Grape, though perhaps not quite so rich in lupuline. As he will get no return from his hop roots the first season, he will do

well to plant corn, not only in the hills with the roots, but in the intermediate spaces, making 3552 hills of corn to the acre. With a favorable season, his crop of corn will prove a most decided help to his finances.

As the hop plants come up, they will require supports, for the hop is a rapid climber. Some put up small cheap poles the first year, and set their permanent ones the second year, but this is generally regarded as a needless expense. The hop poles, however, are a very serious item of expense in New England and New York. The Grape and Cluster hops are both strong and heavy vines, and require poles from 16 to 20 feet in height, and $2\frac{1}{2}$ to 3 inches through the butt. The New York hop growers prefer cedar, as being more durable. They are worth, in most parts of that district, about 15 cents each, when sharpened and ready for setting. As two are required to each hill, he will require 1776 to the acre, and his poles for six acres will cost about \$1600. These poles will last, however, without renewal, not far from 15 years.

Some hop growers reduce the first outlay, materially, by purchasing but half the number of poles, and setting to the hills of every other row a stout stick about four feet in height, and using twine to connect these short stakes together, and to stretch from them to the top of the taller poles on each side. This has the advantage of exposing the hop vines more fully to the sun, and perhaps increases the yield somewhat, but the cost of the twine, which must be renewed every year, and the trouble and expense of the tying, makes the ultimate outlay about the same as the supplying of poles for each hill. On the continent of Europe another plan is adopted, which is perhaps less expensive, but we doubt if it would answer as well for our vigorous and rapid climbing varieties. Along each alternate row a post, say three and a half inches in diameter and five feet high, with the bark on, and both ends dipped in a preparation of creosote, is set to each hill. A stout iron wire is run along the top of these, fastened to each by a small staple. The alternate rows are provided with small stakes, rising not more than a foot above the ground, from which strings run to the iron wire for each vine. These are much simpler and more easily replaced than those already described, but hardly afford sufficient room for the vines.

If poles are used exclusively, the second year they will require tying together at the top, and many hop growers connect adjacent hills together. Early in the season, too, a careful search for grubs

is necessary, and this can hardly be done in season by the hop grower and his single man of all work; usually he must secure the services of several men, boys, or girls, in this search. It is indispensable that the hop-yard should be kept free from weeds; and as in our dry climate it is better to plant flat than in hills, the careful use of the cultivator two or three times in the season, with a little help from the hoe, will generally suffice for this purpose.

At some time between the first setting of the hop plants and the season of picking, in the ensuing year, our young hop grower must erect his hop house and kiln. For his little yard one kiln will answer, though two would be better. The kiln should be of stone except its pointed top; below it should have a furnace, and hot and cold air chambers; above these, at a height of from 12 to 16 feet, should be the drying floor, circular, about 18 feet in diameter, floored with slats an inch and a half wide, and the same distance apart, and these covered either with hemp matting or a galvanized wire cloth. The pointed top should be crowned with a swinging ventilator, which will permit a free passage of air in whatever direction the wind may be. On a level with the drying-room, is a cooling room, fully ventilated, where the hops may be laid to cool and lose their excessive bitterness, and from this they are passed to the room below, where they are pressed and baled. The cooling and packing rooms can be a wooden building. The expense of the kiln and hop house, if only a single kiln is put up, will be about \$2000.

At the close of the second summer, our young friend comes to his first experience of hop picking. This, in the hop growing districts, is the gala time of the year, the epoch from which everything dates, and to which housekeepers and housemaids alike look forward, the one with anxiety, the other with the most joyous anticipations. All that Christmas and hiring time were to the Southern housekeeper, and more, is hop picking to the Northern matron in the hop district. It is the universal hegira of the maids of the kitchen; no wages can induce Bridget or Mary to do housework during the three or four weeks when their services are in demand by the hop growers. If nimble-fingered and active, they can earn \$2 or \$2 50, aside from their board, daily, and their employers feed them well; then the change in their work, and the assurance of having "a good time generally" with their associates, adds to the pleasure. Hop picking is, nevertheless, hard and fatiguing work. The pickers begin at or before sunrise, and,

with a half hour's nooning, work as long as they can see. The hops are commonly picked in large boxes, containing from 24 to 40 bushels. These boxes are divided both by a longitudinal and transverse partition of thin lath, into four compartments holding from six to ten bushels each. They are raised a little from the ground, and have handles at the ends to facilitate their removal from place to place. One man and four women, girls, or sometimes boys, are assigned to each box. The man is called the box-tender, and it is his business to supply the boxes with poles, which he raises from the ground as needed, cutting the vines about a foot high, to see that the picking is properly done, to remove the poles after they are picked, strip them of the vines, and stack them securely. Occasionally, an active box-tender can serve two or even three boxes. The pickers deposit the hops each in their own division of the box, and are required to put in no leaves or stones, or blasted and immature hops. The boxes should be emptied at least once a day, and no hops allowed to remain in them over night. A swift and skilful picker will pick 30 bushels, or even 40, in a day. The price was formerly only from 15 to 25 cents per box or compartment of eight bushels (beside board); the present season it is 50 cents.

The boxes, as fast as filled, are carried to the kiln, which should not be too distant; usually it is necessary to keep the fires up in the kiln night and day. The morning's picking is put upon the kiln floor at noon, being spread evenly to a depth of eight to twelve inches, and the temperature regulated to the proper degree of heat, which may be at first quite high, and the steam and water of evaporation from the hops must be allowed free egress through the swinging ventilator at the top. Some hop growers have a tube which carries the hot air above the hops, and then throws it over the surface. Cool air should be admitted from below, to mingle with the hot air and force it more rapidly through them. If the hops are rusty or discolored from any cause, it is usual to burn a little sulphur under them as soon as they are well warmed through, in order to bleach them partially and bring them to a uniform appearance. Some turn the hops in the kiln in order to insure their more thorough drying; others regard this as injurious, as tending to break up the hops, which are very brittle at this time, and render them less marketable. In a properly constructed and regulated kiln there is little danger that any portion will be imperfectly dried. Ten or twelve hours are required to dry a kiln.

The picking of the afternoon is usually put on about midnight. When the drying is completed the hops are carefully raked out upon the floor to cool, and, by free ventilation, to acquire sufficient toughness and coherence to prevent their crumbling in packing. After lying for one or two days in the cooling room they are shoveled down a wooden tube or hopper to the packing room

When the hops are in a proper condition for baling they are thrown into a box, lined with bagging, which forms the lower portion of the hop press, and trodden or beaten down till the box is filled; another piece of bagging is then put over the hops and the press, which, in some cases, causes an iron follower to descend, and in others, forces up the bottom of the box, reducing them to a compact bulk, and the sides and ends of the bale having been sewed (a part of the sides and ends of the box being movable), the pressure is taken off and the bale tumbled out, marked, and it is then ready to send to the warehouse. The bales usually weigh about 200 pounds. The hop presses most in use in New York are Gifford's, Harris's, and Atwell's, all manufactured at Waterville, Oneida county. The last named is a new press, easily worked and much liked. The Harris Press has also a high reputation. American hops are not pressed so solid as the English or Continental hops, the growers believing that the packages, though somewhat more bulky, retain the aroma and volatile oils better than the compact bales of foreign markets.

Up to this point, it has been a constant succession of expenditures for our young hop grower, except what he may have been able to realize from his corn crop and from the residue of his farm; but he has now arrived at a point where he commences to realize the profits of his outlay, though he will not receive the full benefit of them before the third year. Let us now see how the account stands. The purchase of the farm is in the nature of a permanent investment, constantly increasing in value; we will not include that, therefore, in our estimate of the expenditure necessary for establishing a hop-yard, but will put down the interest on the cost of the six acres at 7 per cent per annum as a fair rental of the land. We have then on the debtor side:

Two years' interest on \$480, at 7 per cent.,	\$67 40
Pair of horses,	350 00
Manure, (including plaster of paris for second year's,)	350 00
Hop house and kiln,	2,000 00
Rough Roots,	40 00

Poles,	1,600 00
Tying, grubbing, and hoeing,	36 00
Picking,	250 00
Drying and baling,	50 00
Total,	<u>\$4,743 40</u>

Of this sum the hop house and kiln are a permanent investment, and not an expenditure to be repeated often in the cultivation of the hop. The horses and the poles are also items which will not require to be renewed under ten or fifteen years. On the credit side we have :

Increased value of the land comprised in the hop yard,	\$150
Value of corn crop, first year, 75 bushels to the acre, at \$1 per bushel,	450
Hop crop, second year, 1,200 lbs. to the acre, 7,200 lbs., at 50 cents,	3,600
Total,	<u>\$4,200</u>

For the next year there will be only a small outlay for manure, the vines being burned in the hop yard, and the ashes strewed around the hills, and the stable manure and some plaster of paris applied to the hills. The expenditure for tying, grubbing, hoeing, and picking, will be about the same, or perhaps a little more, than the previous year. Five hundred dollars will be ample allowance for all these items. If the season is favorable, and neither lice nor blight affect the hop, his third year's crop should be full 1400 pounds to the acre, and his receipts probably \$4200. This would encourage him to enlarge his hop yard, since the cultivation of a few acres more will enhance his profit without greatly increasing his outlay. It is to be borne in mind that if hops of good quality can be grown, there is hardly a limit to their consumption at remunerative prices. The constantly increasing consumption of lager beer and of malt liquors in this country, and the demand for them in France, where they are to a great extent taking the place of the wines of the country, insures a market for all the hops which can be raised, without taking into the account the fluctuating demand from Great Britain, where in the best years, there are not enough grown for home consumption, and where, often, 15,000,000 or 16,000,000 pounds, or the entire American crop, are imported.

THE ENEMIES OF THE HOP.—Were the hop crop a sure one, or liable to no more accidents than Indian corn, it would be so im-

mensely profitable that thousands would rush into it, and, if that were possible, the market would soon be glutted. But it is, in fact, a somewhat uncertain crop, though less so here than in Great Britain. In that country there is not on an average more than one really good crop in six years, and the average annual yield in any given series of years does not exceed 750 pounds to the acre. Here large crops occur on an average once in three or four years, and the average annual yield is, taking the disastrous years into the account, very little, if at all, below 1000 pounds to the acre, while in such years as 1862 it rises to 2800 pounds to the acre, or nearly double the best averages of the English hop yards.

The *weather*, which in England exerts so great an influence upon the crop, does not seem to affect it much here. A frost early in August would, indeed, produce serious injury, especially to the later varieties; but such an occasion, though, of course, possible, is very unfrequent. The present summer, especially since about the middle of July, has been remarkably wet and cool, yet the crop bids fair to be large and of fine quality.

The *aphis*, or *hop-louse*, is a more formidable source of injury to the hop. The aphides are among the worst enemies of our vegetation, destroying the foliage and fruit of the currant, raspberry, blackberry, and strawberry; infesting the potato, and producing mischief wherever they make their attacks. They have infested the hop for the past three years, blighting whole yards, and rendering their product worthless. They attack the hop in England, both early and late, and the vines, where the grounds are liberally manured, may recover from an early attack, a change of temperature or of the electrical condition of the air often proving fatal to the lice. Here, they usually appear only late in the season, and a hop which ripens by the 10th of August, or even as late as the 14th, would generally escape their attack altogether. When they once attack they multiply very rapidly, a single female *aphis* producing 15 or 20 young a day for two or three weeks, and these attaining maturity in a very short time. They feed upon the sap or juices of the vine, and speedily destroy the vitality of both the leaves and vine, causing them to turn dark brown, almost black. If the hop is fully formed, they speedily attack that also, and in a single day cause it to turn black, and exhale a most offensive odor. If the hop yard is kept rich in manure, the plant will be more vigorous and better able to resist the attack of this destructive insect.

The most efficient natural remedy against the ravages of the *aphis* is its enemy, the *ladybug*, or as it is called in England, the *ladybird*. This insect, which is usually abundant in the hop yards, kills the lice, each one destroying 30 or 40 a day, and if the weather is clear and the *aphis* has just commenced its destructive work, the ladybug will succeed in clearing the vines; but if the parent aphides have succeeded in depositing their young on the under side of the hop leaves during cloudy days, when the ladybug is inactive, they will have some time to carry on their ravages. The ladybug, however, is busy during this time in depositing its eggs also on the under side of the leaves, usually in clusters of about 20 each. These are soon hatched, and the progeny which creeps forth is the "black-nigger" or "serpent," as the hop pickers call them, a lizard-shaped, ferocious-looking little creature, which, as soon as hatched, pounces most voraciously upon the young lice, which are its peculiar food, and unless they are too abundant, clears the vines of them. Having gorged itself for some successive days with the aphides, the "serpent" attaches itself to the under side of the leaf, and after a short period of existence in the larva state, casts off its shell and becomes the perfect ladybug, when it again pursues its good work of destroying the *aphis*. The hop growers preserve, with great care, this useful little insect, regarding it, justly, as one of their most efficient friends.

In 1864, a hop grower of Otsego county, a Mr. Turney, satisfied himself that a fluid preparation which he had compounded would destroy the hop-lice and prevent their ravages, and during 1865 and the present season he has sold it largely. It is applied with a syringe, and is said to benefit the hop plant as well as destroy the *aphis*. He publishes numerous testimonials, from large hop-growers, of its efficacy. It has been tested to a considerable extent, and whether from this cause, or from the fact that the season has been unfavorable to their development, it is certain that they have effected very little injury to the crop the present season. Just as the time of picking commenced they appeared in considerable numbers in some yards, but were too late to injure the hops much, though they had sucked the juices from the bine pretty thoroughly.

The *mould* or *blight* is another of the parasitic enemies of the hop. It is properly a disease of the hop, and is probably a parasitic vegetable fungus usually generated in wet seasons and damp situ-

ations. It has never prevailed so universally in our American hop districts as the lice, but has affected yards planted in low grounds and those which had not a sufficiently free access to air and sunlight. To avoid any tendency to it, the plants should not be set nearer than seven feet apart, and if the ground is low or moist, the method of training the alternate rows on strings or wires and strings, will be found preferable to the exclusive use of poles, as it will favor the more free admission of sunlight and air.

When this blight appears to any considerable extent upon the hops as early as June or the beginning of July, however luxuriant the vines may then appear, there is no hope of a crop worth picking. It is at first noticeable on the upper side of the leaf as a white speck not larger than a small pin's head, the spot increasing in size till it attains a diameter of about an eighth of an inch; below this white spot, on the *under* side of the leaf, there is a corresponding indentation, which renders this incipient indication of mould unmistakable. From the spots on the surface of the leaf the seeds of this parasitical fungus are blown in all directions, and the minutest particle of this white dust, which settles on another leaf, in a few days becomes a speck of mould. Each new spot in turn propagates the disease, and thus we perceive this vegetable pestilence proceed with the fearful rapidity of geometrical progression until, if the season is damp, acre after acre is destroyed. The prudent hop grower will watch carefully his vines, and as the disease commences near the ground, will give special attention to the pulling off of the suckers, which sprout through the hills in the summer months, and to the destruction of every spotted leaf.

MARKETING THE HOPS—has of late years become a distinct business. Formerly the hop growers consigned, or sometimes sold their hops to New York hop dealers, of whom some six or eight monopolized the business, and sold to the brewers here or exported them to England, as they deemed most advantageous. Now, in three or four of the larger villages of the New York hop district, as for instance at Waterville and Cooperstown, there are four or five firms, with ample capital, whose sole business is buying and selling hops. These firms have usually one or more partners who are thoroughly familiar with the qualities and value of the hops which are offered them, and who buy from the growers. Another partner gives his attention to the selling, visiting the breweries throughout the country, and presenting his samples. Most of these firms are in constant communication, directly or indirectly,

with the European hop dealers, and export hops to them, or import from them, as the condition of the market requires. The quotations of prices of hops in Kent and London are received almost daily by these houses during the hop season, and those of the Belgian and French markets weekly. The effect of this establishing of local markets for hops here has been, to improve the quality of the hops and the style of packing; and the analysis of the American hop having demonstrated its greater value for the brewer's purposes, it is gradually working its way into foreign markets as a high-priced hop. The hop grower profits, also, by the establishment of these local markets, in being able to obtain a better price for his crop. Formerly a very large share of the profits went into the pocket of the dealer, and the grower was at his mercy; now the profits are, as they should be, mostly with the grower. The prices of hops in the New York market, on the 1st of May, of each year, from 1855 to 1866, were as follows:

<i>Per Pound.</i>		<i>Per Pound.</i>		<i>Per Pound.</i>		<i>Per Pound.</i>	
1855,	19c.	1858,	8c.	1861,	16c.	1864,	28c.
1856,	9c.	1859,	13c.	1862,	15c.	1865,	35c.
1857,	10c.	1860,	10c.	1863,	20c.	1866,	65c.

It is not probable, that the price will, for many years to come, be as low as it was in 1857, 1858, and 1860. The cost of production is now about 13 cents per pound, and the demand is such that prices will, in all probability, range in the neighborhood of 50 cents per pound."

THE VALUE OF NIGHT SOIL.

"Gather up the fragments, that nothing be lost."

The possession of ample resources is never a warrant for waste. How well, then, does economy become those whose resources are limited by narrow bounds.

An indispensable requisite of successful farming in New England is a sufficient supply of manure. It matters little whence this is obtained, so long as it possesses the needful fertilizing properties.

The most fertilizing substance at the command of our farmers is, with few exceptions, utterly neglected, wasted, lost. This seems to be due, in varying measure, to two causes—ignorance and prejudice.

Such is not the case with hundreds of millions of people who till the ground for a livelihood, and whom we look upon as far beneath us in the scale of progress, enlightenment and civilization.

We depend chiefly upon our barn yards to furnish manure for our lands. Those millions have no cattle and no barn yards, and yet they annually apply manure enough to their land to insure good crops.

Their resource is equally at our command. They employ it. We ignore it.

I do not argue that because the Japanese and Chinese have accomplished the difficult task of maintaining for centuries together a high degree of productiveness, therefore we should imitate them in all things; live upon grains, without meat, reduce the size of our farms to three or four acres each, or copy divers other of their ways; but I may pertinently ask whether we may not learn a useful lesson from their successful practice. One important item in that practice is carefully and diligently to save every particle of human excrements and to fertilize their land therewith. It is their almost exclusive dependence for this purpose. With this practice a far greater number of persons are supplied with food from a given extent of surface than are fed

from a similar area in any other part of the world. The facts in their case show conclusively, that what may be saved from the food which supports a given number of persons will, if applied to the soil, more than reproduce the amount of food consumed.

My aim at this time is not so much to present an elaborate article upon the composition, properties and uses of night soil, as to call attention to the subject, and to suggest an easy and simple method whereby a great waste may be stopped, a valuable addition made to our means of fertilization, and at the same time, in many cases, an offensive, injurious domestic nuisance wholly obviated.

I suppose the efficacy of night soil as a fertilizer will be readily admitted, and that no need exists of presenting evidence on this point. It is generally understood that the value of excrementitious manures depends chiefly upon the character of the food consumed by the animal yielding it. Everybody knows that what is dropped by cattle fed on straw and bog hay is inferior to that from cattle fed upon good hay and grain. As no other animal is so well fed as man, the excrements of no other possesses so great fertilizing powers as his.

It is also true that no other is liable to such rapid loss of a large part of its manurial value. In warm weather it very quickly passes into decomposition, ammonia is evolved, and waste goes on with unexampled rapidity.

Whoever purchases the contents of vaults, as commonly managed, under the impression that they embrace the whole, or the half, or the quarter, of the fertilizing capabilities of what has gone into them, will, most likely, find himself egregiously mistaken.

To preserve from loss it is needful either that the night soil be immediately applied, which is practically out of the question, or else that it be mixed with some absorbent substance, which is easily done. For this purpose dry peat or muck is perhaps the best, and where easily available an abundant supply should always be at hand. A double advantage is obtained by its use, for besides the primary one of deodorizing the excrement, and preserving all its capabilities, the vegetable matter of the muck is itself converted into valuable and immediately available food for plants.

If peat or muck be not at hand, an equally effective substitute will be found in common dry earth or ordinary loam, and that which contains a fair proportion of clay should be preferred to what is mostly sand, for the reason that the absorptive power re-

sides in the clay, and were it not for the trouble of reducing stiff clay to a fine powder, this would be recommended instead of loam. The latter, however, usually answers well enough.

The method proposed is simply this:—First, to have in connection with every privy a sufficiently capacious reservoir of peat or loam, and to be sure that it is filled at a suitable season of the year with *fine dry* material.

Second, to arrange some simple contrivance whereby a proper quantity of this can be dropped, *daily*, upon the deposits left there; and, lastly, to do so.

This method, proposed some years ago by a writer in the Journal of the Royal Agricultural Society of England, has been tried by the writer, and he testifies from experience that an amount of fertilizing matter altogether surprising has thus been saved. The testimony of many others is equally to the same point.

ADOPTION OF THE DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

Congress having recently authorized the use, in the United States, of what is known as the Metric System, and as it is likely, before long, to be exclusively used, it seems well to employ all practicable means to diffuse an acquaintance with its merits and its methods. It may be of greater importance to the commercial than to the agricultural classes, but all are deeply interested, and I have thought some remarks here would be useful and well-timed.

Hitherto the States have prescribed their own standards, and as these are often unlike, we seem to be drifting towards a state of confusion like what prevails in some older countries. How serious such confusion might become is well shown by a few facts regarding what exists elsewhere. An English writer says: "If we buy a bushel of wheat at Bridgend, we get 168 pounds; at Darlington, 73½; at Worcester, 62; at Monmouth, 80; at Shrewsbury, 75; at Wolverhampton, 72; at Manchester, 60 or 70, according to whether we are dealing in English or American wheat; at Newcastle, 63; at Cærmearthen, 64."

A German measure, the *scheffel*, varies thus: in Bremen it is a trifle over two bushels; in Brunswick a little over eight and a half bushels; in Hamburg somewhat less than three; in Hesse Cassel two and a fifth; in Prussia one and a half; in Leipsic two and eight-tenths; in Wurtemberg four and nine-tenths. Other weights and measures also present great differences.

Our differences hitherto have been more in the way of enactments constituting different weights to be the equivalent of the bushel, but the *system* in use, is *in itself, complicated, arbitrary and destitute of order, harmony and useful relations among its parts*. Nothing keeps it in use except the fact that we have been taught and are accustomed to it.

The advantages of the Metric System over the one in common use are much greater than those of our decimal currency over the old one of pounds, shillings and pence; and when once the

simple, orderly, harmonious, decimal system of weights and measures is fairly in use, it will be matter of astonishment how an intelligent, progressive people ever came to endure so long such needless inconveniences. The fact is, that the Yankee nation is rather behind the age in this matter. The committee of Congress in their report say, "the simple order, beauty and convenience of the metric system have so commended it to universal acceptance that it has already been adopted exclusively or permissively by nearly all the nations of Christendom." Nearly all learned societies in this country and in Europe have advocated its adoption; it has worked its way into nearly all scientific books and periodicals, and its progress is urged forward by the combined intelligence of the civilized world.

The hindrances in the way of its exclusive adoption are not many nor great, but they require time to be overcome. The greatest, by far, is the difficulty of *unlearning* and *disusing* what we learned in childhood and are accustomed to. We all remember how gradually the decimal currency took the place of a worse one, and how many, past middle age or of a particularly conservative turn, scarcely relinquished the old way while they lived. Another is the sacrifice of the value in the measures and scales now on hand. This, however, may be less than would be supposed at first. Platform scales would require only new beams and peas. Manufacturers of the more popular sorts, such as Howe's and Fairbanks' already make them for the metric system, and would doubtless soon offer new beams and peas at a moderate price to replace the old ones. Ordinary balances would only require new weights.

To learn the new system is not a difficult matter. It may be mastered and fully learned in an hour by almost any one, and many a boy in his teens would do it in half the time.

The first thing to be done is to learn the names and meanings of the four units:

Meter, the unit of length; (which is also the *fundamental* unit of the whole system, all the others being derived from it.)

Liter, the unit of capacity.

Gram, the unit of weight.

Are, the unit of surface.

Then it is necessary to learn four Greek numerals used for *multiples*, as follows:

Deka	10
Hecto	100
Kilo	1,000
Myria	10,000

Then three Latin numerals used for prefixes, to indicate *subdivisions* of the units. These are :

Deci	1-10th
Centi	1-100th
Milli	1-1,000th

It is a decimal system. There is a measure ten times the length of the meter, which is called the Dekameter; another, a hundred times the length, called a Hectometer; another, a thousand meters in length, called a Kilometer; and one 10,000 meters long, called a Myriameter. Then, to divide the meter, we have the Decimeter, which is one-tenth as long as a meter; the Centimeter, the one-hundredth of the meter; and the Millimeter, which is the one-thousandth of the meter. So with the other measures and weights; the same prefixes are used (so far as needful) to all the units; the Greek for multiples, and the Latin for the fractions or subdivisions. Altogether we need to learn eleven words and their meaning, and the whole system is mastered. It is well that all the terms be fully understood and perfectly familiar, although, in practice, it is found that not all come equally into common use. In this respect it is much as with our decimal currency. If we speak of the sum represented by the figures \$65.43, we are apt to say, sixty-five dollars and forty-three cents, rather than six eagles, five dollars, four dimes, and three cents; and so in the metric system, some of the terms come into more frequent use than others.

As above remarked, the *meter* is the fundamental unit. This word is derived from the Greek word "metron," signifying measure. The meter is a measure of length, being a ten-millionth part of the distance from the equator to the pole, and is about thirty-nine and three-eighths inches—or, to give it more exactly, with a decimal of inconvenient length, 39.37079 inches. From the meter all the other measures and the weights are derived. Thus the unit of area or surface measure is called the *are*. This is the square of a dekameter—and of course equal to one hundred square meters—or about one hundred and nineteen and a half square yards. A surface of one hundred ares is called a hectare,

(which is the square of a hectometer,) about two and a half acres, (or more exactly, 2.471 acres.)

The one hundredth part of an are is called a centare, equal to one square meter, (or 1550 square inches.)

For measures of capacity, the *liter* is the unit. The liter is equal to the contents of a cube the edge of which is one-tenth of a meter. It is a little more than our wine quart, and less than our dry quart. One hundred liters constitute a hectoliter, (equivalent to one-tenth of a cubic meter,) and not far from 26½ gallons. The tenth of a liter, called a deciliter, is a trifle less than our gill of wine measure.

In weight, the unit is the *gram*. The gram is the weight of a cube of water, (at its greatest density,) each edge of which measures the one-hundredth of a meter. It is equivalent to nearly fifteen and a half grains (or more exactly 15.432 grains). One thousand grams constitute a kilogram, (about two and one-fifth pounds,) a denomination much used. A thousand kilograms make a millier, (twenty-two hundred and four and six-tenths pounds,) not very far from our old-fashioned "long ton" or "gross ton." The subdivisions of the gram, as the centigram and milligram, are already almost exclusively used by scientific men in all countries in such chemical and other researches as require delicacy and accuracy.

The State of Maine was one of the earliest to recommend Congressional action in this matter, as will appear from the following preamble and resolve passed by the Legislature:—

Whereas, there now exist throughout the civilized world incongruous and inconvenient systems of weights, measures and currencies, without a proper basis or any uniform ratio of divisions and multiples, thus subjecting the scholar, the teacher and the man of business to numerous and needless perplexities in computation and in trade, and making it a most difficult task to determine the absolute or the comparative value of many coins, quantities and admeasurements now in use; and whereas, a reform in regard to these inequalities and irregularities is demanded by the highest interests of education and commerce, therefore,

Resolved, That our Senators and Representatives in Congress be requested to use their influence to have that body consider the proposed subject, and establish a uniform decimal system of weights, measures, and currencies, fixing their standards or units

of each measure, with their subdivisions and multiples, in the most concise and simple manner; and that the more effectually to promote this desirable reform, an international commission be recommended for the purpose of producing an uniform system of metrology throughout the commercial world.

It is hoped, therefore, that the people of Maine will not, at the least, be more backward than others to familiarize themselves with the system, and that we and our children may enjoy its benefits at a comparatively early day.

A BILL to authorize the use of the metric system of weights and measures.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act, it shall be lawful throughout the United States of America to employ the weights and measures of the metric system, and no contract, or dealing, or pleading in any court, shall be deemed invalid, or liable to objection, because the weights or measures expressed or referred to therein are weights or measures of the metric system.

SEC. 2. *And be it further enacted,* That the tables in the schedule hereto annexed shall be recognized, in the construction of contracts, and in all legal proceedings, as establishing, in terms of the weights and measures now in use in the United States, the equivalents of the weights and measures expressed therein in terms of the metric system; and said tables may be lawfully used for computing, determining, and expressing in customary weights and measures the weights and measures of the metric system.

Measures of length.

METRIC DENOMINATIONS AND VALUES.		EQUIVALENTS IN DENOMINATIONS IN USE.
Myriameter	10,000 meters	6.2137 miles.
Kilometer	1,000 meters	0.62137 mile, or 3,280 feet and 10 inches.
Hectometer	100 meters	328 feet and one inch.
Dekameter	10 meters	39.37 inches.
Meter	1 meter	39.37 inches.
Decimeter	1-10th of a meter	3.937 inches.
Centimeter	1-100th of a meter	0.3937 inch.
Millimeter	1-1000th of a meter	0.0394 inch.

Measures of surface.

METRIC DENOMINATIONS AND VALUES.		EQUIVALENTS IN DENOMINATIONS IN USE.
Hectare	10,000 square meters	2.471 acres.
Are	100 square meters	119.6 square yards.
Centare	1 square meter	1,550 square inches.

Measures of capacity.

METRIC DENOMINATIONS AND VALUES.			EQUIVALENTS IN DENOMINATIONS IN USE.	
Names.	No. of liters.	Cubic measure.	Dry measure.	Liquid or wine measure.
Kiloliter or stere	1000	1 cubic meter	1.308 cubic yards	264.17 gallons.
Hectoliter	100	1-10 of a cubic meter	2 bus. & 3.35 pecks	26.417 gallons.
Dekaliter	10	10 cubic decimeters	9.08 quarts	2.6417 gallons.
Liter	1	1 cubic decimeter	0.908 quart	1.0567 quarts.
Deciliter	1-10	1-10 of a cubic decimeter	6.1022 cubic inches	0.845 gill.
Centiliter	1-100	10 cubic centimeters	0.6102 cubic inch	0.338 fluid ounce.
Milliliter	1-1000	1 cubic centimeter	0.061 cubic inch	0.27 fluid drachm.

Weights.

METRIC DENOMINATIONS AND VALUES.			EQUIVALENTS IN DENOMINATIONS IN USE.
Names.	Number of grams.	Weight of what quantity of water at maximum density.	Avoirdupois weight.
Millier or tonneau	1000000	1 cubic meter	2204.6 pounds.
Quintal	100000	1 hectoliter	220.46 pounds.
Myriagram	10000	10 liters	22.046 pounds.
Kilogram or kilo	1000	1 liter	2.2046 pounds.
Hectogram	100	1 deciliter	3.5274 ounces.
Dekagram	10	10 cubic centimeters	0.3527 ounce.
Gram	1	1 cubic centimeter	15.432 grains.
Decigram	1-10	1-10 of a cubic centimeter	1.5432 grains.
Centigram	1-100	10 cubic millimeters	0.1543 grain.
Milligram	1-1000	1 cubic millimeter	0.0154 grain.

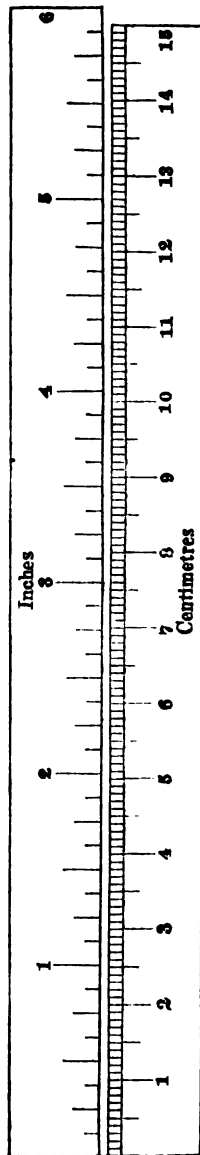
JOINT RESOLUTION to enable the Secretary of the Treasury to furnish to each State one set of the standard weights and measures of the metric system.

Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he is hereby, authorized and directed to furnish to each State, to be delivered to the governor thereof, one set of the standard weights and measures of the metric system, for the use of the States respectively.

Scheme of the weights and measures of the metric system.

Ratios.	Lengths.	Surfaces.	Volumes.	Weights.
1000000	Myriameter.			Millier, or tonneau.
100000	Kilometer.			Quintal.
10000	Hectometer.	Hectare.	Kiloliter, or stere.	Myriagram.
1000	Dekameter.		Hectoliter.	Kilogram, or kilo.
100	Meter.	Are.	Dekaliter.	Hectogram.
10	Decimeter.	Centare.	LITER.	Dekagram.
1	Centimeter.		Deciliter.	GRAM.
1-10	Millimeter.		Centiliter.	Decigram.
1-100			Milliliter.	Centigram.
1-1000				Milligram.

Scale representing a portion of the meter divided into centimeters and millimeters, together with a six-inch scale divided into eighths of an inch; one inch contains 25.4 millimeters.



JERUSALEM ARTICHOKE.

(Helianthus Tuberosus.)

Is it not possible that this tuber has fallen into unmerited neglect as an agricultural product?

On many farms in Maine it has been grown, or rather has been suffered to grow, to a limited extent, but in no case has it come to my knowledge that it has received treatment deserving the name of cultivation. Being unable therefore to collect data in relation to its worth or worthlessness from any facts of experience among us, I propose to gather and quote from various authorities what are asserted to be facts, with regard to the composition of its tubers, its productiveness, value as food for animals, and other related matters.

In the first place, it may be remarked that the common name is not accurately descriptive of the plant. One might suppose it to be a kind of artichoke which originated near Jerusalem, or was first disseminated from thence, whereas it is not an artichoke at all,* but a sunflower; and "Jerusalem" is only a corruption of the Italian "Girasole," which signifies sunflower. It somehow came to be called artichoke from a supposed resemblance in taste when cooked to the plant properly so named.

Like all the sunflowers it is a native of America, and this, although said to be indigenous to the warm climate of Brazil,† is capable of withstanding the utmost severity of a northern winter—the leaves and stems only perishing at the approach of frost.

* The proper Artichoke, or Globe Artichoke as it is usually called, *Cynara Scolymus*, is nearly related to the thistle family, and has a dense, close head, or fleshy receptacle, on which the flowers are based. These heads are boiled and constitute a very delicate dish. It is propagated by suckers or offshoots from old plants; the preparation of soil being much like that for asparagus.

† Boussingault remarks: "This plant is generally believed to be a native of South America, but Humboldt never met with it there, and according to M. Correa it does not exist in Brasil. The property which the tubers have of resisting the cold of our winters, and several botanico-geographical considerations, lead M. Brogniart to presume that the plant belongs to the more northern parts of Mexico."

In this respect it differs widely from the potato and yam, both natives of the same hot climate.

It was introduced into Europe about the same time as the potato, and for a long time it seemed doubtful which would gain the preference for cultivation; more than one old writer roundly asserting its decided superiority over the latter. Prof. Low, of Edinburgh, says of it, "This plant produces stems from 5 to 10 feet in height. It is propagated with the greatest ease from tubers, like the potato. It grows rapidly, and may be cultivated like the potato, but the intervals between the rows should be larger. The tubers are in clusters attached to the roots of the plant. As compared with the tubers of the potato they are watery, and may be believed to be inferior in nutritive properties. But the quantity is frequently very large; about 500 bushels per acre, it is said, having been produced without manure. The tubers do not seem to have great fattening properties, but they are eagerly eaten by animals. Taking into account the hardy qualities of the plant, its productiveness, and easy culture, it may be doubted whether it deserves the universal neglect into which it has fallen. Granting its inferiority as an article of food to other plants now cultivated for our domestic stock, it must be of some importance to have a plant that can be so easily raised, and on soils so low in the scale of fertility."

A writer in the Penny Cyclopædia says, "The tubers when cooked form a good substitute for potatoes, and are by some preferred. Many animals eat them with avidity, and they are especially recommended for sheep."

John Wilson, in his "British Farming," says, "This root, although decidedly inferior to the potato in flavor, is yet deserving of cultivation. It grows freely in inferior soils, is easily propagated and requires little attention in its cultivation. When once established in the soil it will produce abundant crops for successive years in the same spot. It is sometimes planted in woods to yield shelter for game, for which purpose it is admirably fitted, as it grows freely under the shade of trees and yields both food and covert. In properly fenced woods it might yield abundant and suitable food for hogs, which might there root it at their pleasure without damage to anything. Where they had mast along with these juicy tubers, they would undoubtedly thrive apace. After they had grubbed up what they could get, enough would be left

to reproduce a crop for successive seasons. Such a use of this esculent seems well deserving of careful trial."

In France, and yet more in Germany, this plant has been and still is cultivated to a much greater extent than it has ever been in England or Scotland, and is esteemed as a valuable crop, and a desirable food for animals. This estimation is based not only on theoretical data obtained from its analysis, but upon practical demonstrations in feeding experiments.

Boussingault, who seems to have given careful attention to the subject, says, "It is propagated by the tubers which it produces, and which are regarded for good reasons as most excellent food for cattle. In times when the potato was not very extensively known, it also entered pretty largely into the food of man; when boiled its taste brings to mind that of the artichoke, whence its name. * *

"There are few plants more hardy and so little nice about soil as the Jerusalem Artichoke; it succeeds everywhere with the single condition that the ground be not too wet. The tubers are planted exactly like those of the potato and nearly at the same time; but this is a process that is performed but rarely, inasmuch as the cultivation of the helianthus is incessant, being carried on for many years in the same piece; and after the harvest, in spite of every disposition to take up all the tubers, enough constantly escape detection to stock the land for the following year, so that the surface appears literally covered with the young plants on the return of spring, and it is necessary to thin them by hoeing. The impossibility of taking away the whole of the tubers, and their power of resisting the hardest frosts of winter, is an obstacle, almost insurmountable, to the introduction of this plant as one element in a regular rotation. Experience more and more confirms the propriety of setting aside a piece of land for the growth of this productive and very valuable vegetable root.

"Of all the plants that engage the husbandman the Jerusalem Artichoke is that which produces the most at the least expense of manure and of manual labor. Kade states that a square patch of Jerusalem Artichokes in a garden was still in full productive vigor at the end of 33 years, throwing out stems 7 to 10 feet in height, although for a long time the plant had neither received any care nor any manure.

"I could quote many examples of the great reproductive powers of the helianthus; I can affirm, nevertheless, that in order to obtain

abundant crops, it is necessary to afford a little manure. I shall show in another chapter, however, that this is manure well bestowed.

"Like all vegetables having numerous and large leaves the helianthus requires light and air; it ought therefore to be properly spaced. The original planting of course takes place in lines, but in the succeeding crops and those which are derived from small tubers accidentally left in the ground, the order is, of course, lost; it is only necessary to destroy a sufficient number of the young sprouts which show themselves in the spring to leave those plants which are preserved with a sufficient space between them. When the plants are somewhat advanced the ground should be dug with the spade, and hoed to destroy weeds.

"The tubers are gathered as they are wanted; for, not dreading the frost, they may remain in the ground the whole winter. They do not require, like the potato, to be collected and pitted at a certain period; they require no particular situation, no particular care for their preservation. During winter the stems die and dry up; they may be burned or a better use is put them in the hogstye where the pith will absorb a large quantity of liquid manure. The average quantity of dry leaves and stems has been estimated at three tons per acre. The following quantities of tubers have actually been gathered in Alsace on one acre:

	Tons.	Cwts.	Qrs.	lbs.
"Sandy soils,	4	3	3	6
Soils of the best quality,	10	8	3	13
At Bechelbronn (mean),	10	16	0	8
Bechelbronn, crops of 1839-40,	14	8	2	27 "

Space would fail, nor is it needful to present here the details of the experiments instituted and carried out by M. Boussingault to ascertain its comparative value as cattle food. His results may be briefly stated as follows—100 pounds of good hay were found to be equivalent to

280	pounds	potatoes.
280	"	Jerusalem artichokes.
400	"	mangold.
400	"	carrots.
400	"	turnips.

The equivalent amount of artichokes was given in these trials in place of other articles named, for terms of from 11 to 16 days, and

at the end, the weight of the animals was found to be the same, or with a trifling gain, as at the beginning, the usual work also having been performed.

According to Mr. Flint's remarks* in his report of the operations in connexion with the agricultural school at Hohenheim in 1863, it would appear that the comparative estimate in which roots and hay are now held varies somewhat from the estimate of Bous-singault. He says, "The winter fodder statement shows that 100 pounds of hay are equal in nutritive value to 275 pounds of beets, carrots and artichokes; to 200 pounds of straw, rape husks and potatoes; to 160 pounds chaff, to 125 pounds beer malt, to 60 oats; to 50 pounds crushed grain and oil cake." In his account of the institution at Grignon in France,† Mr. Flint says, "The artichoke served as a transition crop to improve poor calcareous soils, which it occupied for several years without receiving any manure. It has since been cultivated in the same conditions as other crops. It yields from 22,500 to 31,500 pounds of roots, on an average, per acre, and 2700 pounds of stalks which when cut are mixed with the residue of the distillery and fed to cattle."

Composition of the Tuber.—Old John Mortimer, in the Country-man's Kalendar, 1707, speaking of the potato, (which, by the way, can hardly be considered a field crop before A. D. 1750,) says: "The root is very near the nature of the Jerusalem Artichoke, but not so good or wholesome."

Whether better or worse, there is a marked contrast in the proportions of their most important proximate constituents, and one which readily accounts for their different appearance when cooked, one being wet and jellyish, the other dry and mealy. The mean of various analyses of the potato, show the proportion of starch contained in it to be near 15 per cent., and of sugar 3 per cent. While, according to M. Braconnot, in the artichoke there is 14.8 per cent. of (uncrystallizable) sugar and 3 per cent. of starch, or more properly of inuline.‡

* Report Mass. Board of Agriculture, 1863, p. 187.

† Same, p. 227.

‡ The roots of many plants, among which are those of the dahlia, elecampane, colchicum, dandelion and chicory, contain a variety of starch to which the name of inuline has been given. It is a white tasteless powder sparingly soluble in cold water but readily so in boiling water, from which, unlike common starch, it is deposited again on cooling in pulverulent form. Like common starch it is readily converted into dextrine and grape sugar by being boiled with very dilute acids.

So far as we can judge of the feeding value of these two sorts without actual proof by feeding, there would seem to be very little choice between them.

Dr. Salisbury of New York, some years since made analyses of two varieties, the white and red, the latter being the smaller and richer of the two, and remarks, "The artichoke contains much less starch than the potato, but is richer in sugar, dextrine, albumen and casein. Its power for fattening, perhaps, would not equal that of the potato, but in muscle-forming products, or nitrogen bodies, its composition would place it quite equal to that of the potato. The analysis shows it to be even richer."

When, however, we come to examine the results of an ultimate analysis of the tuber of the helianthus, we find another difference, which, as I conceive, gives to it, in one aspect at least, a value beyond that of any other vegetable root usually fed to domestic animals. It is this: the root is found to be richer than others in the most valuable mineral constituents, phosphoric acid and potash—and as these would not be all appropriated by the animals feeding on the roots, so much as was not thus appropriated would be embraced in the excrements and consequently add greatly to the value of the manure—to the means of fertilization and increase of other crops.

Analysis of the ash of the tuber of the artichoke shows it to contain as follows:

Silica,	1.52
Phosphoric acid,	16.99
Sulphuric acid,	3.77
Carbonic acid,	11.80
Lime,	3.34
Magnesia,	1.30
Peroxide of iron,	0.45
Potash,	55.89
Chloride of potassium,	4.88
	<hr/>
	94.94

Prof. Way says, "The mineral composition of the tuber of the Jerusalem Artichoke may be thus expressed—

Mineral matter (in pounds) in one ton of the tubers:

Silica,	0.61
Phosphoric acid,	6.81
Sulphuric acid,	1.51

Lime,	1.84
Magnesia,	0.52
Peroxide of iron,	0.18
Potash,	22.40
Chloride of potassium,	1.96
	<hr/>
	35.33

Here it will be seen that, weight for weight, this vegetable contains nearly four times as much phosphoric acid, and three times as much alkali as turnips, beets or carrots. Taking into consideration the large produce of this plant, and the little manure or cultivation required by it, we are at a loss to see where it obtains alkaline phosphate, *unless it is possessed of superior powers of acquiring mineral sustenance.*"

The above statements, it is believed, are all from good authorities, and may be relied upon as substantially correct. A brief recapitulation gives us the following facts :

1. The *Helianthus tuberosus* or Jerusalem artichoke will grow on almost any soil, no matter if it be poor, if it be not also too wet.
2. It will produce fair crops without manure and with little cultivation.
3. In nutritive qualities, for feeding to domestic animals, it compares favorably with the vegetable roots in common use.
4. After one crop is obtained, no further seeding of the land is required, and no cultivation beyond horse-hoeing between the rows—for thinning and weeding.
5. The tubers may be harvested in the fall, *or not* ;—may be left in the ground without injury till spring.
6. It seems to possess the power of obtaining from the soil *an amount of the most valuable mineral constituents greater than any other root, and, consequently, by the manure it will furnish we can enrich in a corresponding degree other portions of the farm.*

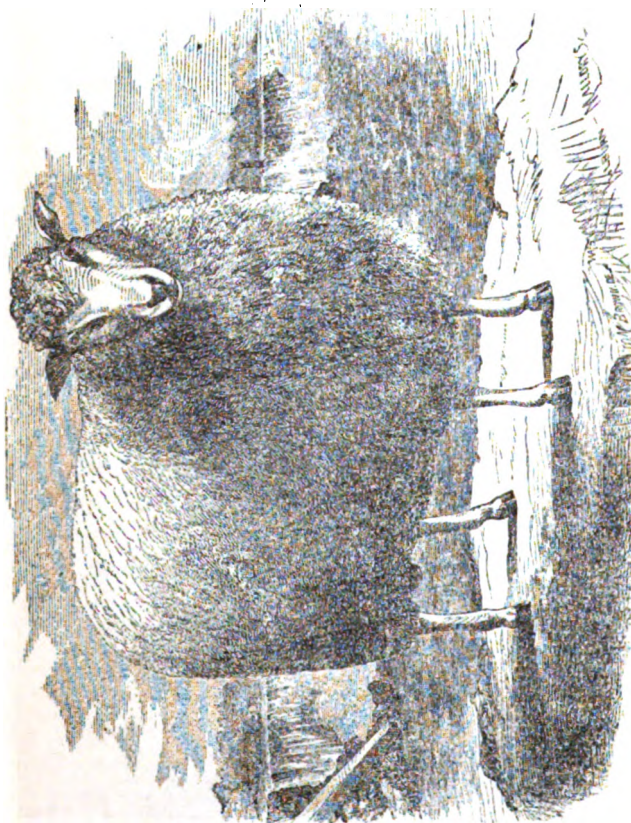
Now, then, if we have fair promise that, by appropriating to this vegetable a piece of poor land, part of a run out mowing field for instance, which now hardly pays for swinging a scythe or running a mower, with no expenditure of manure and little of labor, we can secure a respectable crop of roots which will help to nourish our stock, help furnish succulent food in winter and spring, and help manure the farm, it would seem worth a fair trial.

Let me suggest, if any one does try it, or if they do not, that, as a large portion of the potash and phosphoric acid contained in

food passes off in the urine, means should be used for their absorption and retention, and that the manure should be never allowed to lose its richest portions by needless washing and leaching.

I find very little regarding the culture of this root in any American agricultural periodicals. In one place it is said that Mr. Thomas Noble of Massillon, Ohio, planted the tubers in drills $2\frac{1}{2}$ to 3 feet apart, using a little more seed than for potatoes ;—result, 1500 bushels per acre. A Mr. Smith of Erie county in the same State, recommends them for stock, and says “ it yields from 800 to 1500 bushels per acre ; the latter being grown on the best sandy loam and cultivated in the best manner.”

Dr. Holmes once remarked of it : “ In regard to a substitute for the potato as a cattle and pig feed, we have long had a favorable opinion of the common Jerusalem artichoke, as it is called. It does not contain so much farinaceous matter as a good potato. If roasted it will not ‘ crack open so mealy ’ as a first rate potato will, but otherwise its ingredients are very much like the potato, and we think it vastly better than soggy, half-diseased potatoes. The tubers will soon obtain complete possession of the ground where they are planted, and if planted on a piece of waste ground not needed for other purposes, become valuable on this account.”



COTSWOLD BUCK NIAGARA.

The property of Elijah Wadsworth, Livermore Falls, Me. This buck was imported October, 1883, from the flock of F. W. Stone, "Moreton Lodge," Guelph, Canada West. The sire of "Niagara" won the first prize at the great "Provincial Exhibition" held in Toronto, Canada West, September, 1882, as the best yearling "Cotswold" buck, and the first prize at the county of Wellington Agricultural Society's Show, held at Guelph, in October of the same year. At the free "Exhibition of Specimens of the Different Breeds of Sheep," held at Boston, Mass., in April, 1884, being then but one year old, he received much attention, and fully sustained the character of the "Cotswolds" in comparison with other breeds. Exhibited at the "Essex Agricultural Society's Show," held at Lawrence, Mass., in September of the same year, he won the premium offered by the Society for the best buck, over strong competition.

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ON PLOWING AND MANURING IN AUTUMN.

BY PHINEAS BARNES, ESQ., OF PORTLAND.

[The following paper is the substance of an address delivered before the Cumberland County Agricultural Society, at Gorham, October 5th, 1865, and before the Aroostook Agricultural Society, at Houlton, Sept. 27, 1866.]

The complaint of "short seasons" for agriculture, in this latitude is so common, and apparently so well founded, that every considerate person among us, whatever his own pursuit, is likely to have some sympathy with those, who are primarily affected by this difficulty. Reflecting much and often upon this hardship, which besets our New England farm-life, the writer has been led to think out, and now ventures to bring forward, a method of cultivation, which tends materially to prolong our season for the growth of useful crops, and to heighten the effect of all the agencies of production, during the whole period between seed-time and harvest. And it may awaken a specific interest in what is proposed, to declare beforehand, that the method recommended, is revolutionary in its character, whether its effect be more or less complete.

The question concerns the production of those annual plants, which furnish food for man, and for the domestic animals. By the very statement of the complaint about short seasons, we divide the year into two parts—that part of the year in which food-plants grow—and that part of the year in which they do *not* grow.

With respect to nearly all our annual crops, the period of non-growth is much the longer of the two parts of the year. No doctrine or theory can alter this established climatic fact. Our business is to make the most that is possible, of that shorter period, which is all we can have, between the shooting of the germ and the gathering of the harvest. If then, by any faulty practice, we lose any part of this briefer period of growth, if, for instance, when the seed ought to be sprouting in the ground, we have not yet prepared

the ground to receive the seed—this loss is irrecoverable. The sun does not wait for us, either in spring or in autumn. He fulfils his course, whether we are ready or not.

In what is called a "wet spring," so often the experience of New England life, our complaints almost assume the form—that the sun is hastening too fast towards the summer—but that he delays and hides his genial influence. It is not merely that the seed cannot be put into the ground, but the common expression is, "We cannot get on to the land with a plough." This expression admits, that in the late wet spring, at the very time, when we would be glad to have the seed in its bed, the bed is still unprepared for it, and we must wait, and wait, for the rains to pass away, before a furrow can be turned. And when the clouds are gone, how many of the long sunny days of May are lost, before the land can be dried and ploughed, and harrowed and manured, so that the seed can be cast into the earth, and the plant commence its too short period of growth?

An illustrative lesson—though from the nature of the case, not a conclusive analogy—may be obtained from observation of the perennial plants, under the influence of spring. These do not wait for cloudless skies. The mild temperature of spring pushes them forward, whether it rains or not. In fact, they rejoice in spring rains. Who has not observed the flashing green of a well-dressed grass field in early spring! Who does not wonder at the vine, bursting with vitality at every joint! What farmer has not seen, with vexation, the rampant perennial weeds starting up with mischievous activity, long before he is ready to put a useful seed into the ground? One difference is, that these plants are ready beforehand. When spring comes, they are prepared for it; they begin to grow, precisely at the moment, when their growing season begins; they lose no time. Their lesson to us, is, that by every practical contrivance, and by all wise forecast, we should so adjust the conditions of the life of our annual food-plants, that they also shall begin to grow, at the earliest moment when the influences of spring are suited to their capacities, and lose not a day, nor an hour.

Considering, therefore, that under the ordinary New England practice, and for our usual crops, the preparation of the land to receive the seed takes place in spring, that the farmer must wait, sometimes many days, for the late spring rains to be over and the surface of the ground to be dried, before a plough or a cart can be

moved, and then, that other days of warm and genial sunshine must be expended in plowing, and manuring, and harrowing, too hastily and inefficiently perhaps, before a seed can be dropped,—the revolutionary change now proposed is, to turn our method of cultivation right about—end for end—to prepare in the autumn the seed-bed into which the seed is to be cast in the spring, and to deposit in the earth, in the fall beforehand, the fertilizers, which are to nourish the next year's crops. So, nothing will remain to be done in spring, but to drop the seed and cover it, at the first moment when the earth is warm enough to quicken its germ.

Of course, it is not a thing unheard of, to plough and manure the land in autumn. Something of the kind is done on every well managed farm. But the proposition now urged is, to adopt this method of cultivation as the general and customary rule for all crops, that are raised under the plough—not merely to break up sward land in the late summer or early fall, but to plough, in the fall, the stubble lands also, which are to be planted or sowed in the following spring;—not merely to spread some top dressing in autumn, but to carry out and put *into* the ground all the fertilizers intended for next year's plants, and to put this dressing, (if the supply is not enough for broad cast application,) into the very furrows and drills, where the seed is to be dropped at seed-time—the exceptional cases to this general practice being left to arise, only as required by special exceptional causes.

Such being the statement of the case, the following considerations are submitted, in explanation and advocacy of the method proposed.

The two processes of cultivation, which precede the act of planting or sowing, are, the preparation of the seed-bed, and the preparation and deposit of the plant-food, in the place where the plant is to grow.

What is the preparation of the seed-bed? By the action of the plough and the harrow, we undertake to break up the hardened surface of the earth, to crush and grind its clods, to pulverize its whole mass, so as to open it to the penetration of air and heat, so as to expose its comminuted particles to the dissolving influences of rain, so as to enable the roots and rootlets of the expected plants to push their way freely, in all directions, in search of the food, on which they are to live, whether it be the mineral food naturally pervading this pulverized soil, or the organic fertilizers to be furnished by art.

What do we mean—what should we mean—by the preparation and furnishing of plant-food? Confining the inquiry to the common fertilizer used on New England farms, is it a proper preparation of food for the young plant to put crude and green stable manure into the furrows and hills, at the same time that we drop the seed, so that the tender rootlets in a few days will be in direct contact with this rank and undissolved mass? Our highest authorities declare that young plants are actually poisoned by green manure. Is it not, on the contrary, the indication of common sense, that manure will be most effective when it is mixed with and distributed through the pulverized material of the seed-bed, as it is also the rule of the most familiar science, that no manure is useful, until it is dissolved?

In fact, we may almost say, that the whole object of these two primary steps in cultivation is, to put things into that condition, which shall effect at the right time the most complete dissolving and distribution of the fertilizers, which are to nourish the growth of plants.

We might endeavor to reach this object by costly and laborious contrivances of art. Liebig declares in one of his latest books, that ploughing should be so thoroughly done, and so many times repeated, that no harrowing will be needed, and the harrow will be a superfluous implement. The English use "clod-crushers" and other ponderous and expensive machines, to effect the complete pulverization of stiff soils. So with the problem of liquid manure. There are the minute and repulsive processes of Japanese and Chinese farming, and the expensive apparatus, by which the English cultivator, Huxtable, distributes fertilizers in this form, through iron pipes and hose. But these elaborate arrangements are all beyond the resources of New England farmers, and some of them, in fact, degrade the laborer, while exalting the art of cultivation.

But it is to be seen, whether nature will not help us, and whether natural agencies will not enable us to emulate the achievements of art, if we will only act in harmony with those simple and unexpensive laws by, which all natural forces are exerted. Our year is divided into the two periods, when plants grow, and when they do not grow. Is the non-growing period all a dead and useless blank? The later months of autumn, the winter, and the early months of spring, are these a mere barrier and hindrance in the farmer's way? When the farmer has cleared

the ripened crops from his fields, does nature then go to sleep, and utterly refuse him all help, between harvest and seed-time?

What are the phenomena, in fact? What would be the application and influence of the forces of nature at that period, if we had all things in readiness to receive their effects?

Suppose the land ploughed before the last of October, and left, it may be, in stiff furrows and rough clods—the fall rains, descending upon it for weeks afterwards, have the effect of softening, soaking, drenching, dissolving these hard masses, carrying into the open ground also, all the air fertilizers, which the rain sweeps from the atmosphere. Nor is any harm done, if the interstices between the clods are filled with water. Following the autumn rains come the irresistible energies of frost and ice, breaking and tearing asunder whatever lumps of earth the rains have not dissolved, and actually lifting up the soil, which the rains have tended to settle and depress. Add now the supposition, that the manure for next year's crop had been put *into* this ploughed land before the fall rains began, whether turned under from a broadcast spread, or placed in the actual, carefully made furrows and drills, where the plants are to grow. The same drenching rains of autumn, the same energies of winter's frost, will dissolve and distribute this manure with triumphant effect. The spring rains complete the result, both for the ground and the manure. The dissolving ice melts the clods, if any are left, melts the manure, if any is not yet subdued. There is no resisting these forces. Water is nature's universal solvent. In milder latitudes, they know it only in its liquid conditions. But in our agriculture, we may have its freezing and melting forces, besides.

For crop lands, thus ploughed and manured in autumn, what fears need there be of a wet spring? The late spring rains, under the growing warmth of the ascending sun, are only completing the preparation for the seed. No anxious waiting to get on to the land with the plough, no dragging of heavy dung carts over the soft furrows. As soon as the rains are over, as soon as the sun has dried the surface of the earth, the genial bed is ready for the seed, and—what is more—at the first moment, when the smallest rootlets of the young plants open their mouths for food, the food is there, and in the exact condition in which nature requires it to be.

It will not fail to be observed, that if the necessities of the farmer require him to use coarse manure, much mixed with straw, this material will have an excellent mechanical tendency to keep

the soil light and porous, while its soluble parts are under the full action of rain and frost.

So, also, it is evident, that if the farmer judges that any particular piece of ploughed land (manured broadcast) has become too much settled and stiffened under the influence of winter, the single ploughing or harrowing that may be required in spring to lighten it and loosen it again, will be a labor so easy and rapid, that the business of planting and sowing will scarcely be delayed a single day.

The obvious objection to this method of cultivation is, that in the fall there is no stock of manure on the farm. The manure is made in the winter, and therefore it must be applied in the spring.

If this objection states a difficulty, on the point of time for applying manure, it admits a greater difficulty, on the point of the fitness of the material. In the spring, the manure made the winter before, is still a crude, undissolved mass. It cannot become perfect plant-food until it has been reduced, mixed and dissolved. How long a time this may require will depend upon the season. If an early drought follows, after planting fields manured in spring, nothing can be more disheartening. We talk as though the plants themselves needed rain. In fact, it is the manure which requires water, so that it may be dissolved, and become fit to nourish the plant.

But the answer to the objection is equally obvious, if there is any soundness in the theory now under discussion. The theory, in fact, states the answer. We must revolutionize our methods. The farmer who has means, must buy one year's stock of manure, in advance, resorting, if necessary, for that first year, to the artificial fertilizers. He will turn his methods, end for end, at once. The farmer who has not means to purchase, must effect it gradually, by cropping a little less land for a time, by special contrivances and diligence in making manure, by scraping the roadsides, by more careful composting, and in whatever possible way, he must gain and save, at first, a fifth part, or a quarter part, of a year's stock—applying that much to a just proportion of his ploughed land in the fall—the next year, another fifth or quarter, and so on—every year, no doubt, increasing his capacity to gain more and more, until within three or four years, he also will complete the circuit, and find his manure heap, in September, ample for all his next year's crops.

We must meet, of course, the question of the summer management of manure. How the heaps shall be formed, where they

shall be placed, how much composting shall be done, whether or not the piles shall be overhauled and repacked—these are details, which every farmer will manage according to his facilities and his skill. But the success of the method requires, at all events, that the stock of manure, thus kept over from April till September, shall be sheltered from the sun. Farmers who have manure sheds or cellars, are supplied with what the case requires. But vast numbers of farmers have neither of these facilities. And if necessity of any kind requires a farmer to pile his manure in the open barn-yard, it is a plain and unexpensive method, to cover the heap with simple, common earth, carefully placed and packed, on the sides and top. If it is thought advisable to shovel over the heap in the course of the summer, no harm will result from mixing this covering with the manure. The mixture and division, in fact, will improve the mass. Repacking the heap, cover it again with earth, till it is needed for use. The manure will all be there, and in good condition, when it is wanted.

The question of ploughing and manuring in the fall, involves, of course, the question whether there is time for these operations, at that season of the year.

If it were common, in this part of the world, to keep very large breadths of land under the plough, the thing could not well be done, with the limited laboring force of New England farms. But our tillage lands are comparatively narrow in area, and, in fact, when we come to this problem, as a practical reality, we may be surprised to find that there is more time and better time for this work, in autumn, than in spring. Count the days in spring, from the time when the New England farmer is first able to "get on to the land" with his plough, to the time when all his seed, except turnips, is in, or ought to be. Hardly more than a month in all! But from the middle of August, when the hay-harvest is everywhere ended, to the first of November, when the fall rains and frost are likely to stop work on ploughed lands, there are more than seventy days. It is true, there are the other crops to be gathered, after haying is over, and the wise farmer will need to order his time skilfully to accomplish, within the same period, the harvesting of this year's crops, and the preparation of the land for the next. But there are intervals and alternations, of which the good manager will always take advantage. The ripened grain and Indian corn must be attended to, precisely when the best weather permits. Ploughing and manuring for next year, must then give

place, for some days. The last of September finds these crops all out of the way. The harvesting of the root crops is far less pressing. These can wait, and take their convenient turns, while the proper share of time is given to ploughing and manuring. In fact, the harvesting of turnips, mangolds and carrots can be put off to the very last, without possible harm. If they are gathered before the ground is inconveniently wet with November rains, it is enough.

It is to be considered also, that the seventy days after the middle of August, are the driest season of the whole year, when the land is ordinarily in the best condition to be worked, and when the temperature is best fitted to the comfort and the activity of all the working force, both men and animals. The days are shorter, it is true, but they are the most enjoyable days of all the year, for open-air life. Compare the wet days of early spring labor, and the hot days that follow, with the dry and cool September and October—which has the advantage in the amount of farm labor that can be accomplished, week in and week out?

This is the proper place to state an exception to the rule of ploughing and manuring in autumn. It is, however, but a half-exception. Where roots are not taken off the land until the very last thing before heavy fall rains and frost, it would, usually, not be practicable to plough this land, the same fall. But the digging or pulling of the roots is almost equal to a ploughing, and, assuming that the roots may not have been so heavily manured, themselves, as to supply the wants of the succeeding crop—assuming, also, that the reserved stock of manure is ample—it is submitted that, in such a case, it is only necessary to wait until the top of the ground is frozen, and then to take advantage of good working days in November, or even in December, to haul out and spread the manure on the surface, leaving it there for the action of rains and frost, and that it would be found in the spring to be nearly as well dissolved and distributed, as if it had been actually worked into the soil, in the fall.

In fact, whenever, for any reason, it is not practicable to plough in autumn, the spreading of manure, after the ground is frozen, may be continued quite until the time when the snow is too deep for the convenient moving of the loads, thus really lengthening out the farmer's working season by several weeks. And in the southern parts of New England, this might often be done, through the whole winter, provided always, that the farmer by revolu-

tionizing his methods of cultivation, had the stock of manure to haul.

It is kindred to this part of the subject, to remark here upon certain general improvements upon farm-lands, of acknowledged importance, but which are commonly not undertaken, or insufficiently carried out, because, according to the common round of ploughing and manuring, the farmer is in no condition to enter upon such improvements, at the proper time.

For instance—subsoil ploughing. If we may credit the unanimous voice of all the books and all the approved theoretical authorities, there is no treatment of land, which is more important and valuable than this. But where is the farmer—where is any considerable number of farmers, in this part of the country—who can show us any experience in the use of the subsoil plough? The writer of this paper has been accustomed, for a long, time to look with interest at what is going on among the farmers, over a somewhat wide extent of this State—but, in all that time, he has never seen a subsoil plough in the State of Maine—neither upon a farm, nor at an agricultural show, nor even in an agricultural warehouse. The reason for the omission to use this implement is obvious enough. It is certain that the theoretical authorities on this subject are right, and it is equally certain that intelligent farmers know it to be so. But what time is there, in the spring of the year, for subsoil ploughing, in this latitude? It is more than can well be done, to plough and harrow and dress the top soil, in the fleeting days that hurry along between frost and seed time! And in what condition is the ground for subsoil ploughing at that time? Obviously, as unfavorable as could well be, too wet and sticky, altogether, as a general fact.

And although the best results of subsoil ploughing are only realized, where the ground is thoroughly underdrained, yet it is plain, that in the dry season, which ordinarily comes after the middle of August, all our good tillage lands would admit of the adoption of this treatment, and a large part of its useful results would be attained. If it were a common and settled habit to do all the ploughing of the year at this period, it can hardly be doubted, that enterprising and skilful men would put in practice the theory which they all believe, in respect to loosening the under-soil, so as to develop its virgin fertility, and find new stores of plant-food, which the generations of their predecessors have never yet touched. The subsoil plough would then have a chance to prove its usefulness, and would become a common implement.

Another general improvement—the top-dressing of grass lands. Most farmers would be glad to do more of this than is now commonly attempted, and, perhaps, the first difficulty in the way, is that the stock of manure is usually not enough, in quantity, to dress the plough-lands and the grass-lands, in the same year. But if there were sufficient, what farmer would haul heavy loads of manure over the soft sward of his grass fields, in April or May? It would be suicidal to attempt it. Unquestionably, the best time for surface manuring of grass lands is after the hay is cut. The ground is then dry and hard, and would suffer little or no injury from the pressure of wheels. But, according to the usual practice, there is then no manure to be hauled. The barn-yard is empty—the manure heaps are not there. No supply has been preserved. The practice has become so inveterate, of using, in the spring, the stock which has been made in the winter, that, even where the supply might be ample, great numbers of farmers put it all into the plough-lands in spring, as matter of course, and the grass fields are left to go hungry, till they are worn out. But if manuring were done in autumn, the obvious sense of giving a part of it to the grass lands, when it could be done easily and without laceration of the sward, would be much more likely to be carried out in practice. It might be ascertained with much more certainty than is now generally allowed, that it is easier and cheaper, and far more pleasant, to keep up the productiveness of mowing lands by liberal top-dressing, at the right time of the year, than it is to wear them out, and then go through with laborious and expensive processes of ploughing and cropping, for their restoration. But there will be no liberal top-dressing of grass-lands, as a settled habit, until there is a settled habit of having a good stock of manure on hand for this purpose, at the right time of the year. And that time is *not* the spring.

Since the argument of this paper thus advocates the application of manure upon the surface of the ground, there to be exposed to whatever atmospheric violence may prevail between November and May, not only upon sward land, but upon stubble also, in these cases, where there is not time to plough it in before frost, it is likely to encounter the objection, so commonly heard in such discussions, that, in this way, much of the virtue of the manure will be wasted by evaporation or wash.

Without attempting here to investigate fully such objection, and, laying out of view the case of tillage lands upon steep hill-

sides, which are exceptional merely from locality, the writer has the means of fortifying his positions by two interesting references to good authorities.

The first is from a very valuable article, by Judge French, on English Husbandry, contained in the Patent Office Report, for 1860, (p. 148,) in the following terms :

"Frequently the manure is spread and remains on the surface several weeks before it is ploughed in, exposed to the action of the atmosphere. This is one of the disputed points among agriculturists in America. The general notion has been, until quite recently, that such exposure of manure subjects it to great loss by the escape of ammonia and other volatile elements, and farmers have hastened to cover it by the plough as soon as possible. Of late, a different theory and practice has made progress, and it has been contended that this loss has been greatly overrated. In Lincolnshire and many other parts of England, the farmers prefer to spread even green manure several weeks on the surface. 'Theory,' say they, 'seems against us, for there must be some loss, and it is difficult to say how there can be any gain, but we know, from uniform experience for years, that we get better wheat crops by this practice.' Upon our suggestion to a very intelligent farmer that the powerful odor from his manure thus spread, indicated great waste, he replied, 'I admit there may be some loss, but I think less than is usually supposed. What we smell, is partly sulphuretted hydrogen, which is of no value, and partly ammonia, which is of great value to agriculturists. The quantity of ammonia thus lost, however, is not great, and might be purchased at any shop for a few shillings.' "

The second citation is from an article in the same volume of Patent Office Reports, (p. 118,) by Mr. Bright, the well known writer on fruit culture. It is there extracted from the Gardener's Monthly :

"The practice of top-dressing, or of surface manuring, has long been the favorite method employed by all intelligent gardeners within the circle of my acquaintance. We have long ago learned that masses of rich, nitrogenous manures are not what plants require about their roots, but that manures are applied much more successfully (and less injuriously) by top-dressing, either in solid or liquid form. Nature never manures her plants with crude masses of concentrated fertilizing substances, but imparts her stimulating and mineral food in a state of most minute subdivision—almost infinitesimal—chiefly from the surface of the earth. * * * * *

The great objection to surface manuring is founded upon the probable loss of ammonia, caused by the exposure of decaying manure, upon the surface of the earth. But this loss has been shown by sound reasoning, and by facts deduced from practical experience, to be much less than is commonly appre-

banded; while the benefits arising from surface manuring, in other respects, more than counterbalance any possible loss of ammonia arising from this practice. * * *

The soluble and valuable substances (of manure) are not lost to plants, by being carried into the soil before they are needed by growing plants. It has been conclusively shown by eminent scientific authorities, that any good soil, containing a fair proportion of clay and carbon, is capable of taking up and retaining effectually ammonia, lime, potash, soda, &c., in a soluble form, so that *little, if any, passes off in the under-drainage water of such soils.* These substances, it is true, may wash from the surface, but *they cannot pass through a good soil and go off in the drainage water.* * * *

When the surface manure decomposes, its elements are washed into the soil, in a state of solution precisely fitted to meet the wants of plants, and they become, themselves, active agents in promoting further decompositions and chemical changes in the entire body of the soil.

Manure then, I say, chiefly upon the surface. * * * * * Top-dress your grass after mowing in July or August, under a burning summer sun; top-dress in the fall before and during the autumn rains; manure the surface, while snow is on the ground, while the March winds blow, and while the April rains fall. [?] Manure your grass instead of your corn and wheat, broadcast, at any time when you have manure and leisure, and I will guarantee that you will be abundantly satisfied with the result."

Skilful observers of the true principles of rotation will note the advice above given, "Manure your grass instead of your corn and wheat." Our too common practice of mowing grass lands, without manuring, until they are exhausted, and then resorting to laborious and expensive processes of ploughing and cropping with manure, until the land is brought to a condition to be seeded again—*this is not "rotation."* It is merely restoration of the soil from a worn out and useless condition. A proper method of rotation requires that the land shall be in good condition, every year, for the crop of that year. The contrary method is almost, though not quite as bad, as if a laboring man should work four days and nights, without stopping, and then take medicine to renovate his system. If the grass land is kept in high condition, every year, by plentiful top-dressing, and avoidance of the ruinous practice of feeding, it is then in precisely the best condition for the plough-crops, which are required to follow. The sod of such land is itself a manure for the succeeding crop. Witness the clover, which, in the great wheat-growing districts, so commonly precedes the wheat. But, as before stated, it is not likely that grass-lands will be kept in that condition, unless there is a supply of manure for

top-dressing, at the right season of the year. If by a change in the habit of making and preserving manure, we should come to the habit of having our mowing lands, at all times, in the most productive condition, this, of itself, would be a revolution in the ordinary New England farming.

And it should not fail to be observed, that the broadcast top-dressing of grass lands, with well ripened manure, in the fall of the year, is the easiest and cheapest of all possible methods of manuring land. Other methods must also be used in their turn, but this is the least laborious and least expensive of all, and it is therefore an important problem to make it as fully available as may be.

Recurring to the case of stubble-fields—a part of these are designed for grain crops the succeeding year, and the manure, if any is applied, is of course broadcast. In the case of winter wheat and winter rye, we have a long settled experience upon the method of fall ploughing and manuring. No farmer ever hesitated to prepare his land in August or September for these crops, because he feared that the fall and winter would wash away or evaporate his manure, or that the soil would settle and harden, under the influence of rain and frost, to the injury of the plants.

As to the other stubble-fields, which are to bear crops the next year, in furrows or hills,—Indian corn and roots, sometimes called the “hoed crops,”—whether the manure, if applied in the fall, should be broadcast, or placed in furrows first opened for the purpose, and then covered over, to await the seed time in spring—this, perhaps, would primarily be, a question of the *quantity* of manure available. A farmer, who had at all times an ample abundance of fertilizers, and who was able and willing to employ the proper force to prevent weeds from stealing one-half the dressing, might, perhaps, adopt the economy of broadcast manuring in autumn, and in that case, the opening of furrows in spring, to receive the seed, would be merely a part of the process of planting. But, usually, the limited stock of manure at command seems to compel the method of placing in the furrows or hills, only enough for the plants which are to grow in those lines. And here, perhaps, is to be apprehended the chief practical difficulty in adopting the method of fall manuring for hoed crops. The labor appears to be increased. The land is to be ploughed, (probably harrowed,) the furrows to be opened, the manure to be deposited in them, and the furrows to be covered again—the dropping and covering of the seed to come afterwards, in the spring. This is precisely the

method, however, adopted by skilful growers of turnips, save only, that the whole or a part of the work is done at a different season of the year. Whether such a method of preparing and dressing the land, in the fall, for the Indian corn and potatoes of the next year is practicable, with due economy of time and labor, may be partly a question of contrivance, good management and ingenuity. Convenient apparatus both for opening and for covering furrows is now common enough, and since the well decomposed manure, kept over from April to September, and properly taken care of meanwhile, will be found to be in a comparatively dry and friable condition, it may not be too sanguine to anticipate that a manure cart will be devised, with an apparatus attached, to open and close the furrows, while the manure is dropped, intermediately, as the cart is drawn across the field.*

If some such method is practicable for these crops, then the business of planting, in the spring, may be the lightest farm-work of the year. The boys and girls of the farm can do it all.

If these views are, to any degree correct, a large part of their usefulness will be found in the help they suggest against what is really the greatest difficulty in New England agriculture. The most terrific enemy of the New England farmer is *drought*. Against all other climatic disadvantages, we have some compensating balances of gain, and can employ some sort of forecast. In a very wet season, grass will grow and forage roots will thrive, however corn and grain may suffer. A late frost in June, or an early frost in August, may cut off or diminish the yield of one or more crops, but something else will be saved. But in a severe drought, nothing is safe. Everything is liable to be destroyed.

Providentially, droughts of sweeping destructiveness are rare in our climate. But partial droughts of much severity are very common, and the New England farmer is exposed to suffer the diminution of some of his crops, very frequently, from this cause. A drought in spring or early summer is least common of all. It is in midsummer, or after that time, that they are most common and most severe. But if we could foresee a drought in May or June, in what condition would we desire to have our crop lands, at that

* A mechanical difficulty may appear to present itself—the traction of the furrowing and covering apparatus, in addition to the weight of the load. But the manure will be lighter, by a large per-centage, than that taken from heaps in the spring, and the cart may be much less cumbersome than such as are used in ordinary spring work. The ground, also, will be drier, usually.

time? In the condition of clods of earth, not yet broken and pulverized, with masses of manure, not yet decomposed and dissolved—both clods and manure drying and baking, harder and harder, every day, in contact with the rootlets of the struggling plants? Or, in the condition, in which these lands would certainly be, if they had been lifted by the plough, the fall before, to the disintegrating influences of rain and frost, and if the manure had been, by like influences, thoroughly dissolved and distributed through all the feeding-ground of the plants? We cannot foretell or foresee a June drought, but we *can* put our plough-lands into that condition, beforehand, which will give to the growing plants their only chance of living successfully, through such a visitation. And, in like manner, if the drought does not occur till after the beginning of July, it is easy to see that if the young plants of the year commence their growth, at the first moment of their proper growing season, and go on rapidly and vigorously, with an abundant supply of food from the start, all ready for them as soon as and as fast as they need it, they will have gained, by mid-summer, a strength and substance of root and stalk, which will give them a reasonable promise of holding out, and maintaining their ground through several weeks even, of such later drought.

It is precisely with young plants as with young animals. Both are nourished by food. Both must have their food at the moment they begin to live, and it must be of the right kind and in the right form. Wild plants have their food supplied by nature, and, accidents excepted, it is always suited to their condition. The annual crops of our agriculture must have their food furnished by the hand of man. If they begin to grow at the middle of May, but have no proper supply of food till the middle of June, their life is of doubtful utility. The farmer who puts into the ground by the side of the seed a quantity of material for plant-food, which he knows, nevertheless, will not be fit for food, until some weeks after the germ has put forth from that seed, might take a lesson from himself, as a cattle-grower, and consider the good sense of that practice, by which he aims, above all things, to secure a rapid and vigorous early growth of his young animals. It is *not* by compelling them to *wait* for their food.

The entire difference between profit and loss, both in the raising of crops and the growing of cattle, often depends upon the single question, whether or not the crop or the animal was *well fed*, at

the earliest periods of its growth? If it was, there is ground for a calculation of profits—if not, the result may be a laborious and expensive loss.

If these theories of fall cultivation are thought worthy of being subjected to the test of practical experiment, it is a fortunate circumstance that the test can be applied in a small way, without any elaborate preliminaries, and without material risk of loss. Any farmer can try the question. A few square rods of land, one-half ploughed and dressed in the fall, the other in the spring, both receiving the same treatment in the season of growth, will be likely to assist in forming a judgment upon the two methods.

It is an encouraging consideration, in offering these suggestions for a very material change in the order of our methods of cultivation, that this change promises to be, in reality, a direct recurrence to the laws of nature, and a reliance upon those laws. Much of the farmer's life appears to be a struggle against natural forces. His highest attainment will no doubt be, when he brings himself into the most harmonious and faithful coöperation with nature, and with the wisdom and energy of that Divine Providence, of which nature is only the manifestation.

The theories and suggestions advanced in the foregoing pages, as originally put in form for an agricultural address, (October, 1865,) were the result, merely, of the writer's *reflection*. He had had no experience in such matters, and was not then aware that such views had been adopted in practice, or put forward as theory, by any others.

Subsequently, the following instances of such practice, and allusions to it, came to his notice.

At the delivery of the address at Gorham, Friend Samuel Taylor of Fairfield in this State, who was present, took the occasion to state publicly, that his townsman, Mr. Daniel Bunker, an experienced farmer, made it a settled practice to prepare his land for Indian corn precisely in this method, and with a success, in which he was not surpassed by any grower of this crop, in Somerset county. Mr. Bunker's views and practice are stated more particularly, below, in his own words.

The author of the English book, "*Chronicles of a Clay Farm*," (4th edition, 1857,) treating of some points in vegetable chemistry, has, incidentally, one or two noticeable sentences, and an interest-

ing reference to an ancient practice. Speaking of the "labors of the dung-cart, as at present carried on," as objectionable and involving loss, he says, "but with autumn and winter manuring, it is different."

* * * "Rightly, then, so far as their knowledge went, did our *forefathers*, who knew nothing of turnip culture, *plough in their long manure before winter*." And in the same connection, he speaks of the "poor practice" of applying "to a green spring-crop under the burning sun of June, the treasures of the farm-yard, whose spirit is exhaled before the body is buried, and whose body is not rotted time enough to afford its remnant of inorganic food to the crop it is applied to."

"Who can wonder, then, that the 'artificials' should sometimes beat the long manure, for spring application? And who can doubt, that we wise moderns have left half our lesson unlearned, in having *changed the time of manuring*, without changing also the *condition of the manure*?"

In an article in the Edinburgh Review, for January, 1866, the title of which is "Corn and Cattle," the writer, undertaking to trace the improvements in English agriculture, which have succeeded the repeal of the Corn Laws, comes at length to the mention of the steam plough; and in proceeding to state a comparison between the work of such a plough and the labor of horses, he has these sentences:

"But it was discovered that the only method by which root crops could be grown with certainty and success, was by preparing the land for them in the autumn. No amount of mechanical trituration could equal what some writer terms 'nature's wayward team, *frost, snow, wind and rain*,' and, to avail himself of these gratuitous forces, the farmer must turn a deep furrow in the field reserved for his crop, before such forces began to work. * * * It was evident that horse labor would be economised, inasmuch as one ploughing, at the right time, surpassed in effect many at the wrong time; that an early seed-time would be secured; that a far better time for the cartage of manure would be attained; and that, instead of leaving the land virtually closed to the winter's rains and the chemical effects of the atmosphere, the rain, sinking where it fell, would leave its fertilizing properties in its passage downward, and invite the air to follow. But the farmer's horses were limited in number," &c.

In the proceedings of the Massachusetts State Board of Agriculture, for 1864, (Flint's 12th Report,) there appears, in a report of a meeting of the board held at Greenfield, in December, a discussion upon the "Corn Crop," from which the following extracts are made.

Dr. Hartwell, of Southbridge, was the principal speaker, and, amongst other things, made the following statements :

"I plough my land in the fall, smooth over the surface, and then apply my manure; and I usually work it in deep with a horse plough. I spread the manure from the cart, and do not tip it up in heaps, because it is impossible to spread it evenly in that way. * * * I have tried spreading the manure on the ground in the fall and leaving it until spring, but I would not, as a general thing, advise it. If you put it on a westerly declivity, it will blow away; but, if you have a piece of land that is protected by woods, or that has an eastern or southeastern declivity, there is no harm in putting on your manure in the fall. There was a premium offered by our society for the best acre of corn. I measured off one acre, and weighed the crop after it was husked, and it averaged eighty pounds to the bushel in the cob, and the acre produced a fraction over one hundred bushels, for which they gave me the premium, \$18.

Mr. Tidd, of New Braintree, asked, Was your land green-sward or old soil?

Dr. Hartwell. This last year, it was green-sward, that had been mowed some four years. It was turned over, thoroughly smoothed down, and the manure spread over it. To do this, it is necessary to keep a stock of manure one year ahead. I think manure grows better by keeping. I think it is better to plough in the fall, than in the spring.

Mr. Perkins. What time in the fall do you prefer to plough? Does it make any difference, whether it is the first of September or the latter part of November?

Dr. Hartwell. I think September is the best, but farmers must do as they can. They cannot always do the work of the farm at the time they ought to. If I had my choice, I should do it in September, but October or November will answer the purpose.

Mr. Garfield. If I wanted to raise an extraordinary crop of corn for one year, I should certainly pursue the same method that the doctor does; but it is a question in my mind whether manure put on in that way will serve the best interests of the farmer in a succession of years. * * * *

Dr. Hartwell. I can state one fact that will perhaps throw some light upon the question. Several years ago, I ploughed an acre and a half, in the fall, in the manner I have described; I proposed to make a nursery upon half of it, and I put on the manure and spread it upon the surface of the soil, but the frost followed so soon, that I was not able to work it in. I changed my mind in relation to planting a nursery, and in the spring I spread an equal quantity of manure over the remainder of the land and planted it all with corn. *Where the manure was put on in the fall, the corn was a great deal the best.* I could see it in the rows, contrary to my expectation, for I expected that I had lost something on my manure. The next year the land was sowed with oats, and *I could see the line where that manure came, that I put on in the fall. Next year it was sown to grass, and that line was seen three years afterwards.*

* * * * With regard to the system I have spoken of, the farmers are not in a situation to practise it. There are no farmers in our section, that I know of, who have retained a year's stock of manure. They would be under the necessity of losing one year's crop of corn to get into the system. [?] For that reason they usually put on, in the spring, the manure that has been made during the winter. But I certainly would recommend to every farmer, who raises corn, to have one year's stock of manure on hand, if he can possibly get into that situation."

The practical results of Dr. Hartwell's method of cultivation, appear to give assurance that it rests upon a sound theoretical basis. A very valuable and independent confirmation of this is afforded by the long experience of our own fellow-citizen, Mr. Bunker, of Fairfield, who adopted the practice of ploughing and manuring in the fall, nearly forty years ago, and continues it successfully to this time. In a letter from him to the writer, dated Oct. 12, 1866, the following statements are made :

"I am decidedly in favor of manuring lands in the fall, say about this time, or during the month of October. My practice from 1827 to about 1840 was to plough my ground at this season of the year, and haul out and spread my manure on the furrows and harrow the ground and mix the manure with the soil. Next, in the spring, as early as the ground would admit, harrow the same thoroughly, and plant or sow, as I thought best. I found in this practice that the land received all the strength and nutriment the manure possessed, and I produced better crops, and with much less labor. * * * I believe the principle is well settled, that vegetation will not take root and grow upon new, strong manures; therefore it must lie, and be reduced in some way, to be adapted to the growth of vegetation. * * * Lands dressed in the fall, with the full strength of the manure, will hold productive twice as long."

It is interesting to compare this last proposition with Dr. Hartwell's observation of the effect of one fall manuring, through several following years.

Mr. Bunker states further :

"Since about 1840, I have planted my corn as Friend Taylor stated. In the month of October, I plough my ground, and harrow it and furrow it out in the usual way, and drop out the manure in the same way as farmers do in the spring, and then cover the manure about the same as they do, when planting at that season. In the spring, say from the 10th to the 15th of May, I mix up, with a hoe, the soil, which is on the top of the manure, and at the same time mellow the manure well in the hill, and open the top of it very lightly, and drop the corn, and cover it as in the usual planting."

Referring to his crop of 1865, he states that it was the second crop of corn on the same piece, prepared and manured both years, in this way—the land being previously in quite a poor state of cultivation, and having no other dressing whatever, except this manuring in the hill, in the fall. He adds, “I had, when gathered, the second year, from about one and a quarter acres, 200 bushels of ears, and I think the handsomest corn I ever saw. I carried a trace of it to the fair at Waterville, and took the first premium.”

The conclusions of the Massachusetts Board upon Dr. Hartwell's method of cultivating corn, appear not to have been determined. Mr. Agassiz, the distinguished naturalist, who was present as a member of the Board, made some very valuable suggestive inquiries, respecting the depth and width, to which the rootlets of the corn extend, in seeking their nourishment from the earth and the manure. Dr. Loring proposed that a vote should be taken upon the two questions, Would you plough sward-land and put the manure on the surface, in autumn, for a corn crop? or, Would you plough sward-land in the spring, and turn under the manure, for a corn crop? Mr. Tidd said he thought the diversity of opinion in respect to this matter arose from the differences in soil. Dr. Loring expressed himself as of the same opinion, and said he was satisfied each gentleman would vote upon these questions according to the character of the soil he cultivates. Mr. Bull said the questions involved so many considerations of soil and climate, heat and moisture, and succeeding crops, that he would rather have it laid over for future consideration, than to take a vote upon it now. Dr. Hartwell himself, also, objected to the Board undertaking to decide as to the best method of applying manure, and have it circulated, for the farmers to follow. He thought they were not prepared, now, to make so important a decision.

The subject was then laid on the table, and does not appear to have been resumed.

At the meeting of the Board, the following year, an essay was read by Mr. Stedman, on “Manures and their Application,” (Flint's 13th Report, p. 197,) in which occurs the following passage :

“At what time shall we apply manure? It may be thought this question is not worthy of notice. I cannot, however, think it is wholly immaterial, although admitting a somewhat wider range. As top-dressing for grass, I would apply in autumn, or in early winter, if the ground is free from snow.

For spring crops, much is said, of late, in favor of the same time of application. While I favor this theory, and have been satisfied with its results, so far as I have observed, yet I am not sure that we have sufficient data to sustain this as the best course. And beside, spring is the time, when we have at command the largest supply. Let it now be used for hoed crops."

And so, the question was dismissed—being left, unfortunately, to rest upon the merely accidental fact (as distinguished from an essential principle) that the accumulations of the winter happen to be in the barn-yard, in the following spring.

But, in the same volume, is a very valuable matter of fact testimony, well worth quoting. All readers of Mr. Flint's Reports are familiar with the splendid herds of cattle raised by the Messrs. Anderson, of Shelburne. At page 308, in a report upon "the principal agricultural features" of Franklin county, reference is made to their stock, and the writer adds:

"The Andersons cut a very fine quality of hay on their farm, getting four tons per acre from their best lands, mowing twice. *They keep all their manure over one year, and then, without composting, spread it on their grass lands in the fall.*"

At the meeting of the previous year—the same at which Dr. Hartwell's statements were made—one of the Messrs. Anderson was present, and took a leading part in a discussion upon the Improvement of Pasture Lands, in the course of which he said:

"The probability is that the value of the stock, when I went on to the farm, was not more than five hundred dollars. To-day, I would not take four thousand dollars for my stock. I have forty head, and I believe they would sell for that at auction.

Well, there has been no mystery about the matter. *I have let nature work.*"

The testimony respecting the grass-lands of the Messrs. Anderson is like "a nail in a sure place." Habitual top-dressing in autumn—a reserved stock of manure as the basis of the treatment—four tons of hay to the acre to show for it, and herds of cattle, among the finest in New England, to show along with it. This is no mystery, and needs no logic to support it. The practice, in itself, appears to be pure reason.

CROSS-BREEDING.

It will be recollected that a paper on the Principles of Breeding bearing upon the improvement of domestic animals occupied a large portion of my report for 1860. The favorable reception given to that paper in connexion with the deep interest now manifested by stock growers throughout the State, and the general desire to learn whatever is to be known on the subject, induce me here to present two papers written by W. C. Spooner, V. S., for the Journal of the Royal Agricultural Society on cross-breeding in sheep and horses.

ON CROSS-BREEDING IN SHEEP.

It cannot be denied that the natural laws by which the preservation of animal species is effected are involved in considerable mystery, and though the subject is well worthy the attention and study of the practical man as well as of the physiologist, experience is yet fraught with so much contrariety that attempts to lay down any certain guide on it have for the most part been received with considerable distrust. No sooner does the inquirer imagine that he has discovered some particular principle which obtains universally, than he is met by circumstances which apparently upset his previous conclusions. The maxim "*like begets like*," for example, is a rule having very extensive sway, yet, as propagation is the work of two parents, the respective influences of the one or the other is a matter involving considerable diversity of opinion, and prevents anything like a certain conclusion being arrived at. We cannot do better than consider, on the very threshold of our subject, the respective influence of either parent; for on this the merits of pure or cross-breeding must principally depend. The most probable supposition is, that propagation is done by halves, each parent giving to the offspring the shape of one-half of the body. Thus the back, loins, hind-quarters, general shape, skin, and size; follow one parent; and the fore-quarters, head, vital and nervous system, the other; and we may go so far

as to add, that the former in the great majority of cases go with the male parent, and the latter with the female. A corroboration of this fact is found in the common system of putting an ordinary mare to a thorough-bred horse; not only does the head of the offspring resemble the dam, but the forelegs likewise, and thus it is fortunately the case that the too-frequently faulty and tottering legs of the sire are not reproduced in the foal, whilst the full thighs and hind quarters which belong to the blood-horse are generally given to the offspring. There is, however, a minority of cases in which the opposite result obtains. That size is governed more by the male parent, there is no great difficulty in showing;—familiar examples may be found in the offspring of the pony-mare and the full-sized horse, which considerably exceed the dam in size. Again, in the first cross between the small indigenous ewe and the large ram of another improved breed—the offspring is found to approach in size and shape very much to the ram. The mule offspring of the mare also very much resembles both in size and appearance its donkey sire,

These are familiar examples of the preponderating influence of the male parent, so far as the external form is considered. To show, however, that size and height do not invariably follow the male, we need go no further for illustration than the human subject. How often do we find that in the by no means infrequent case of the union of a tall man with a short woman, the result in some instances is that all the children are tall and in others all short, or sometimes that some of the family are short and others tall. Within our own knowledge, in one case, where the father was tall and the mother short, the children, six in number, are all tall. In another instance, the father being short and the mother tall, the children, seven in number, are all of lofty stature. In a third instance, the mother being tall and the father short, the greater portion of the family are short. Such facts as these are sufficient to prove that height or growth does not exclusively follow either the one parent or the other. Although this is the case, it is also a striking fact that the union of tall and short parents rarely, if ever, produces offspring of a medium size—midway, as it were, between the two parents. Thus, in the breeding of animals, if the object be to modify certain defects, by using a male or female in which such defects may not exist, we cannot produce this desired alteration; or rather, it cannot be equally produced in all the offspring, but can only be attained by weeding

out those in whom the objectionable points are repeated. We are, however, of opinion that, in the majority of instances, the height in the human subject, and the size and *contour* in animals, is influenced *much more by the male* than the female parent; and, on the other hand, that the constitution, the chest, and vital organs, and the forehead generally, more frequently follow the female.

We have dwelt on this point the more because on it hinges the difficulty of effecting certain improvements in breeding by means of crossing, and the still greater difficulty of establishing a new breed by such means. So great is this difficulty that many breeders, finding their attempts at such improvements so frequently baffled, or observing this to be the case in the practice of others, cling with superstitious tenacity to the doctrine of *purity of blood*, believing it to be the *Ark* in which alone true safety is to be found.

Now *pure breeding*, which, when carried to an excess, is called *in-and-in* breeding, has its advantages as well as its disadvantages. Its friends observe with great force, that when we have in breeding reached great excellence, it is folly to risk the loss of such excellence by means of crossing; and the more so as the defects of a parent may disappear in a first or second, and re-appear in the third or fourth generation; "*breeding back*," as it is commonly termed. A friend of the writer's, Mr. John Clark, of Lockerly, a strenuous advocate of pure breeding, observes that a correspondent in Suffolk informs him, that he had seen the cross tried between the old Norfolk and Down sheep, and the first cross was admirable, but they soon became disproportioned and unsightly; also the Down and Leicester in some midland counties figured for a time, and then for the same reasons were given up, and such he thinks will be the fate of the New Oxfords, or the mixture of the Cotswold and the Down. He adds, that for the last four years he has used rams from the cross with Down ewes, and the offspring answered his purpose for *falling* lambs, but one lamb in ten presents unmistakable evidence of its mongrel origin.

Again, it is urged that great excellences can only be perpetuated by union with similar excellences, and beyond all this that there is a certain amount of advantage from an unstained lineage—from the very possession of breed, as it is designated. The objectors to *in-and-in* breeding urge, that by so doing we engender weakness of constitution, diminution of size, hereditary diseases, and also a tendency to barrenness; but it is argued in reply to such objections, that they occur from want of sufficient

care in weeding out defective animals, whether as respects constitution or size. It is a well-established fact, that in the human subject too close affinity, such as the intermarriage of cousins, tends to mental diseases and consumption; and we can readily imagine that when there is a tendency to such diseases in a family, this tendency must be greatly increased by intermarrying with a member of the same family. Animals not being subject to mental diseases, the observation does not apply to them with the same force, but it is true in a lesser degree. At the same time, unless the choice is extremely confined, most of the evils of pure breeding can be avoided by careful selection and vigorous weeding. Examples of pure breeding are familiar to us in the admired race-horse, the first-class short-horn, and the Southdown sheep; but so far as purity of breed alone is considered, the mountain sheep of Wales, the Highland Scotch cattle, and the Shetland or Welch, are equally pure; but whilst the latter have been propagated without care or attention, the former have, by careful selection and vigorous weeding, been considerably enhanced in value. A striking example of long continued pure breeding is afforded by the Leicester flock of Mr. Valentine Barford, of Foscote near Towcester, who has the pedigree of his sheep from the day of Bakewell in 1783 to the present time, and since 1810 he has bred entirely from his own flock, sire and dam, without an interchange of male or female from any other flock. He observes, "that his flock being bred from the nearest affinities—commonly called in-and-breeding—has not experienced any of the ill effects ascribed to the practice." His flock is remarkably healthy, and his rams successful, but his sheep are small.

Let us pause for a few minutes to consider what constitutes *breed*, or rather what is meant by high breeding. We shall find that it refers to very different desiderata in different breeds. In the thorough-bred horse it signifies a very high development of the muscular and nervous systems, accompanied by such mechanical structure as when united with it constitutes the highest manifestation of speed and endurance. In the ox, however, it implies very different qualities, viz., early and rapid growth—the development of flesh or muscle on the parts most prized for food—a disposition to lay on fat; these, with the possession of the smallest amount of bone consistent with strength and health, are the principal characteristics of a well-bred animal. Instead of the highly-nervous temperament of the race-horse, we have here a quiet lazy

disposition ; in fact, a lymphatic temperament, by the influence of which the digestive organs reign supreme, and convert for the public benefit a given quantity of food into the utmost amount of flesh and fat. The same observations apply with equal force to the sheep, and in a still stronger degree to the pig. A well-bred pig is the incarnation of everything indolent and lethargic, and the very antipodes of that high organization and nervous development which belong to a high-bred horse. Examples of pure breeding are probably to be found in greater perfection in cattle than in sheep. The *Devon* and *Hereford* cattle have descended through many generations in unbroken lines, and owe the perfection which they have attained to careful selection. The *Short-horns*, although considerably more modern in their origin, and moulded into their present form by a series of successful crosses, have yet been preserved pure with even more rigorous care than the other breeds which we have mentioned. The solid frame and great feeding properties of the *Herefords*—the quality of beef and richness of cream, as well as working properties of the *Devons*, are well known and generally appreciated ; and yet these qualities are insufficient to resist successfully the encroachments of the *Short-horns*, whose early maturity and disposition to lay on both flesh and fat, joined with fair milking properties, are such that they outnumber both the other breeds combined. As, however, the leading purpose for which a breed of cattle is kept is generally well defined, whether for the purpose of the dairy, or for that and early fattening, or simply for beef or for working as well, and, as each of these purposes can be well attained by keeping a pure breed, there is not the same temptation or inducement to cross, which is often experienced in sheep-farming, in order to insure specific advantages which cannot otherwise be attained.

This being the case, we may most advantageously devote our remaining space to the practice of crossing, as illustrated in sheep-breeding. We may start, then, with this principle, that to cross for crossing sake is decidedly *wrong* ; that, unless some specific purpose is sought for by crossing, it is far better to cultivate a pure breed. The country is, indeed, under great obligations to those gentlemen who carefully preserve their breed intact, and endeavor to improve it by weeding and selection. We can readily excuse their prejudices, if they have any, and have no wish to interfere with their creed. Let theirs be the office to preserve our fountains pure and undefiled, and to supply others with the best

sources of improvement by crossing. And we do not confine our praise to those merely who, keeping in the high road of fashion, have succeeded in securing, both by prizes and prices, a full and sufficient reward for their labors, but would award it to those also who, keeping perhaps in the second rank, have yet supplied their neighbors and the public with valuable pure-bred sheep at moderate prices.

History fails to supply us with the origin of our various breeds of sheep; but we doubt not that, for many centuries after the time of the Romans in this country, certain distinct breeds were perpetuated, with little improvement and little change. The progenitors of the present Southdown or Sussex breed, inferior as they were to their descendants, ranged probably, in the days of the Romans, over the Southdown hills; whilst another breed, now happily extinct, occupied for the most part the hills and downs of Wiltshire and Hampshire. A large, bony, narrow, but active sheep, with large head, Roman nose, and long curly horns, high in the withers and sharp in the spine, but yet the largest short-woolled breed in existence, were the denizens of these counties during the last century.

In Wiltshire, although they remained as a pure breed much longer than in Hampshire, yet, as far as can be learnt, they were supplanted by the Southdown, whose superior qualities displaced the old Wiltshire altogether; and we are not aware of any instances in which they were crossed, except for the purpose of crossing them out by using again and again the Sussex ram. Mr. James Rawlence of Bulbridge, near Wilton, whose large practical experience, both as sheep-breeder and land-agent, stamps his authority with considerable weight, observes in reply to the author's inquiry, "The last flock of this breed (old Wiltshire) disappeared about the year 1819, and the substitution of the Southdown commenced late in the last century. In many cases Southdown ewes as well as rams were brought out of Sussex to replace the horned flocks, but in numerous instances the two breeds of sheep were crossed, and by the continued use of the Southdown ram the chief characteristics of the horned breed were merged in the Downs. The cause of the very rapid substitution of the Down for the Old Wiltshire may be found in the fact of the large number of enclosures of common fields which then took place. The sturdy, horned wether was thoroughly competent to take care of himself when the system of feeding in common prevailed, but when each farmer

could keep his flock separate, an animal of superior quality was preferred."

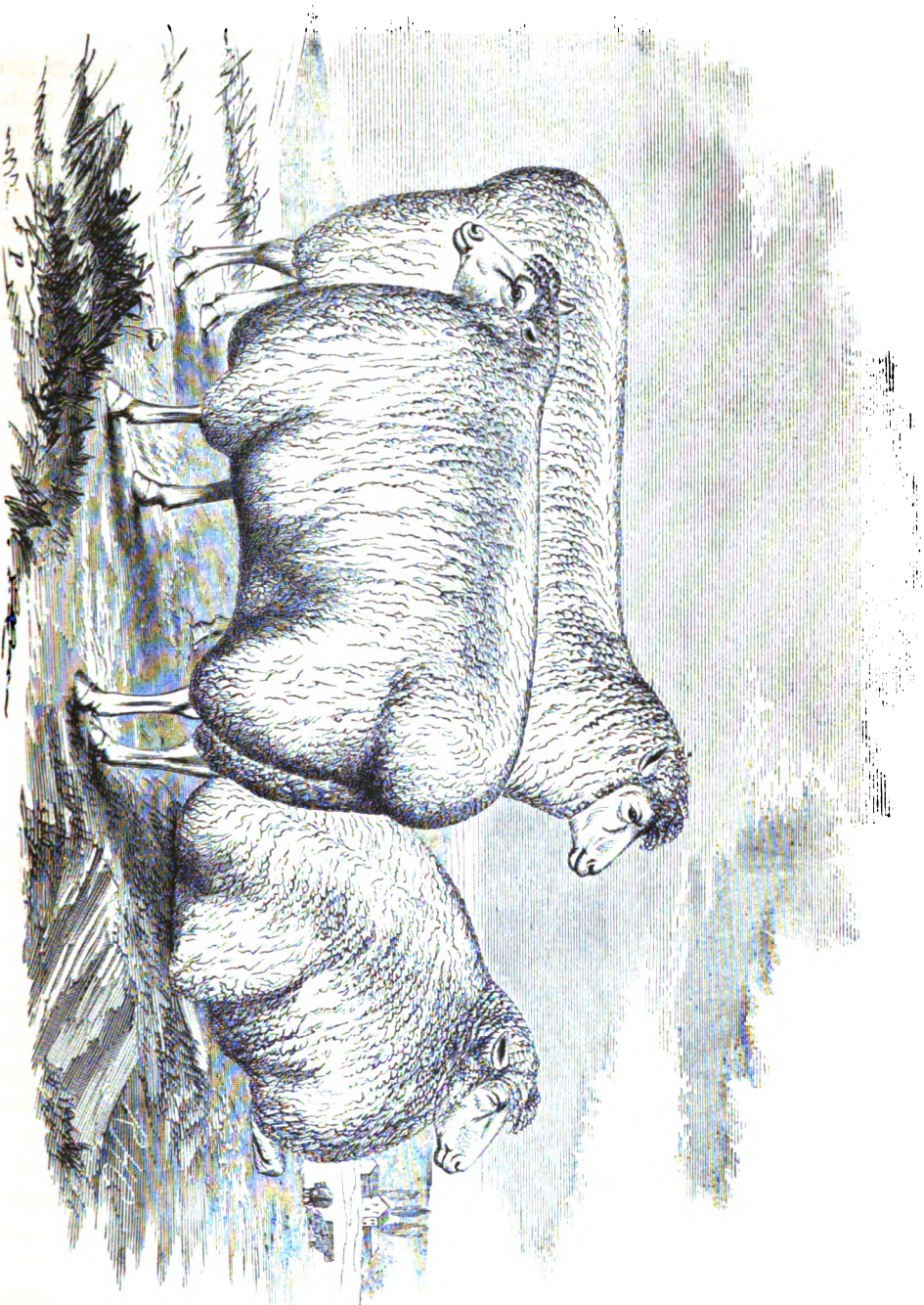
In Hampshire, on the other hand, where the same sheep prevailed and were valued for their hardihood, and their powers of travelling far, and folding hard—properties so valuable when the fertility of the light soils was mainly kept up by these useful manure-carriers—these sheep were extensively crossed. Previous to the close of the last century, the Southdown sheep had been greatly improved by careful selection, and the name of the late Mr. Ellman was well known for his eminent services in bringing out and improving the latent qualities of this valuable breed. About the beginning of the present century the sheep-breeders of North Hampshire began to bestir themselves, and a few enterprising farmers procured some rams from Sussex, of the Southdown breed. Finding the experiment successful, it was repeated again and again, care being taken to select the largest, coarsest, and *blackest*-faced rams, which it was thought would suit the coarse sheep with which they had to amalgamate. How many crosses with the pure Sussex were used we cannot ascertain, but enough materially to alter the character of the breed, to cause the horns to disappear, and to change the color of the face from white to black; and, with these changes, to impart a more compact frame, a broader back, rounder barrel, shorter legs, and superior quality altogether, and yet preserving the hardiness and the disposition to make early growth, which the original flock no doubt possessed, and with it the large head and Roman noses, which form so distinguishing a characteristic of the Hampshire Downs, and which are unquestionably derived from the original breed. Indeed, it is only necessary to inspect a drawing of the original Hampshire or Wiltshire sheep to become thoroughly satisfied as to the source from whence it derived the colossal head which some fifteen years since was regarded as, I will not say an ornament, but an indispensable appendage of the breed. Uniformity of color is also a great point with most Hampshire breeders, with what amount of advantage we cannot say, but black tips to the ears as well as black faces are deemed essential, and any crossing with speckled-faced sheep, such as the Shropshire, is in consequence viewed with dislike.

It was not until the Wiltshire sheep-breeders began to produce some large but more symmetrical animals that the Hampshire men began to consider whether it was not possible to reduce the size

of the heads, without losing the characteristics of the breed. By attention and careful selection this has been accomplished, and we have now a breed of sheep which is admirably adapted to the present system of fattening off at much earlier ages than formerly, and, for the most part, as tegs and two-teeth sheep. It is certainly not owing to any aristocratic patronage that the Hampshire sheep have forced their way into public estimation. They have neither been upheld by agricultural societies or agricultural writers, nor have they been launched into public favor as winners of prizes; on the contrary, they have been laughed at, criticised, and condemned; and yet they have not only held their own, but have spread far and near, so that the county in South England where none are to be found is probably the exception, and not the rule. The Hampshire sheep may, therefore, be instanced as an example of successful crossing, and as a proof of what can be done by the male parent, in changing, in very few generations, the character of the original, and yet retaining some of its good qualities, thus forming a breed more intrinsically valuable than either source from whence it is derived. It has been truly said that the public is wise though composed of fools; and undoubtedly, when the pocket is concerned, the decision of the public is, for the most part, correct. Thus at the various autumnal fairs large lambs are in the greatest request, and command the highest prices, which in itself is a sufficient proof that with a given amount of food they make a greater quantity of mutton. It was found, indeed, by Mr. Lawes, in his careful and valuable experiments, that the Hampshire sheep, although they were surpassed by the Cotswold, yet exceeded the Southdown in the amount of mutton raised from a given weight of food. The greater economy of fattening a young over an old animal may be readily explained by the fact, that whilst the latter increases in fat alone, the former does so both in flesh, fat, and bone, and thus the latter can assimilate a greater amount of the nutritious properties of the food, and is consequently a more profitable feeder.

We have no reason to suppose that after a few generations the Hampshire breeders continued to use the Sussex rams; as soon as the horns were gone, to which, perhaps, the Berkshire Notts contributed, and the face had become black, they employed their own cross-bred rams with the cross-bred ewes. If, then, we were asked what original blood predominated in the Hampshire sheep, we should unquestionably say the Sussex; but if the further ques-

tion were put, Is the present breed derived from the Sussex and the original Hampshire alone? we should express a doubt as to such a conclusion, as there is good reason to consider that some improved Cotswold blood has been infused. Some thirty years since a Hampshire farmer still living (Mr. John Twynam) used the improved Cotswold ram with his Hampshire ewes, and the first cross exhibited a remarkable proof of the preponderating effect of the male. The produce, in size, general appearance, and wool, partook far more of the ram than of the ewe, and it was thought that a most valuable breed had been obtained, which, with the increased size, and weight of fleece, and disposition to fatten of the Cotswold, would combine the hardiness and folding capabilities of the Hampshire. It was found, however, no easy task to perpetuate such a breed after the first cross—the defects of the one parent or the other would appear and re-appear in the second and third generation, and it was only by careful weeding that anything like uniformity could be attained. Mr. E. G. Young, of Broadchalk, Wilts, a close observer as well as an excellent farmer, informs the writer that he, as well as his brother, purchased Mr. Twynam's rams for several years, and has, he conceives, derived advantage from the cross. Mr. Rawlence observes, that the points he has arrived at have been to produce an animal yielding at an early age the largest possible amount of mutton and wool, which he considers the *sine qua non* of sheep breeding; and he adds, it is difficult to estimate the enormously increased production which has within the last few years been obtained by keeping this object steadily in view. Whilst he highly appreciates the high-bred Southdown, he is convinced that the present system of farming demands a larger description of sheep, and one which will produce a heavy weight of wool at an earlier age, and he is not quite sure whether a cross with the Cotswold would not produce a more profitable animal. The absurd fashion of drafting good sheep, if they have not black faces and ears, tends to retard the improvement of the carcass. After some few years a change of farm and other causes led to a discontinuance of the experiment, yet many of the cross-bred rams were sold and let to sheep-breeders both in Hampshire and Wiltshire; and although after dipping once or twice into this breed they then ceased to do so, yet they have continued breeding from descendants of the cross, and thus, in very many of the Hampshire and the Wiltshire flocks, there is still some improved Cots-



IMPORTED COTSWOLD EWES.

Bred by Robert Garne, Aldenworth, Northleach, England. Imported by and property of Rurdett Loomis, Windsor Locks, Conn. Winners of 1st prize as best ewes that suckled their lambs.

wold, and, consequently, Leicester blood.* Probably an increase of wool has thus been obtained. Some say that on the borders of Berkshire the Berkshire Nott was also used, and others contend, although without proof, that a dip of the Leicester has been infused. Be this as it may, there is no doubt that, although for some years past the Hampshire sheep have, for the most part, been kept pure, yet they have been very extensively crossed with other breeds before this period.

We cannot do better than let Mr. Twyman speak for himself on a matter on which he has bestowed considerable attention during a period of ten or twelve years. In a paper he has recently read before a Farmers' Club—after some observations on the respective merits of the Cotswold, the Leicester, the Southdown, and the Old Wiltshire, or Hampshire, from all which sources the present breed is derived—he states his idea was to blend these various breeds together, which he did by using the improved Cotswold ram (Cotswold and Leicester) with the Hampshire Down ewe. 'As a proof of the value of the cross, he observes,—“I have the written documents of the feeder of one hundred tegs sold in 1836, the wool and carcasses from which returned 400*l*.” By using this cross an earlier maturity is gained than by either breed separately. He observes:—“The Leicester and Cotswold will become large, heavy and fat on the outside, but not inwardly, as yearlings; very few Downs will at that age be sufficiently advanced for slaughtering, from their known disposition to arrive more slowly at maturity.” What, then, is wanted is young sheep, large, heavy, and well furnished at a year or fourteen months old, and this object is attained by the cross, as the testimony of the butchers who bought the sheep will show. He continues,—

“You must have observed an immense improvement in the character of the Hampshire sheep generally within the last fifteen or twenty years—an increase of size, a heavier fleece of a longer staple, with a kindlier touch, evidencing a greater aptitude to fatten. I have had my attention called to this fact frequently since I have ceased to be a breeder. How has this altered character been ob-

* It is, we believe, generally acknowledged that the Cotswold sheep have been improved by crosses from the Leicester ram; and although the origin of the latter is involved in some obscurity, yet it is generally supposed that Bakewell, the founder, whilst he used the original Leicester or the long-woolled breed, which prevailed mostly in the midland counties, as his foundation, crossed them with various other breeds until he succeeded in establishing the superiority of excellence which he afterwards sought to maintain by pure exclusive breeding.

tained? Can we recognize none of the Cotswold fleece or his more symmetrical proportions? And, when I tell you that, in the years 1835-36 and subsequent years, I sold very many half-bred rams, not only into Hampshire Down flocks generally, but into those of six or eight of our first ram-breeders whose names are at this day to be seen upon my books; when you must be aware that these breeders are in the constant annual habit of selling one to another in this and adjoining counties; I trust I may without presumption lay some little claim to having supplied a portion of the material from which our present flockmasters have worked up a better and more valuable fabric."

It is a curious fact that, whilst the system we have detailed has been followed in Hampshire, a very different plan has been adopted in the neighboring county of Wiltshire. Here the same large, flat-sided, uncouth horned sheep, whose ancestors were its denizens in the days of the Romans, ranged over the Wiltshire Downs, and, indeed, retained possession some years later than in Hampshire. They at length succumbed to the superior qualifications of the Sussex Downs which gradually displaced them, not by crossing them out so much as by being substituted in their place, and thus the imported Sussex became the West Country Down. At length a larger sheep and particularly a larger lamb was demanded, and then the Wiltshire breeders procured rams from Hampshire and greatly improved their flocks in size, and secured larger lambs. Beginning with Sussex ewes, they have increased the size of the frame without materially enlarging the heads, and thus a very valuable breed of sheep has been formed, the Wiltshire Down, whose more perfect symmetry frequently enables their owners to wrest the prizes from the Hampshire men, and to cause the latter, by the rivalry thus induced, to improve the symmetry of their sheep by careful selection. The Wiltshire Down breeders, therefore, began with the Sussex ewe, and crossed with the Hampshire ram, whilst the Hampshire breeders used the original horned ewe and the Sussex ram. The latter, therefore, have less of the South-down than the former, and, though of greater size and producing somewhat larger lambs, have less symmetry.

Mr. Rawlence, whom we have before quoted, informs the writer :

"The original flock from which my present sheep are chiefly descended, was of the Sussex breed and of moderate quality. I commenced by drafting all the small and delicate ewes, and the remainder were crossed with rams of the Hampshire breed. I bred

from their produce for two or three years, and then had another cross with the Hampshire, still continuing to cull defective ewes. After I had obtained considerable size from the infusion of the Hampshire blood, I had recourse to some rams bred by Mr. Humphrey of Chaddleworth, Berks, which were the produce of the biggest and strongest Hampshire ewes by a sheep of Mr. Jonas Webb's. I use my own rams, and I also frequently purchase a few of the best Hampshire ewes I can get, put my own sheep to them and use their lambs. I also put a sheep of Mr. Humphrey's to some of the best of my ewes, and select rams from their produce, thus getting fresh blood without making an entire cross."

Our account of the Hampshire sheep would be by no means complete unless we noticed the sheep of Mr. William Humphrey, of Oak Ash, near Wantage, Berks, specimens from whose flock have so frequently been prize-winners, and their services generally acknowledged by other improvers.

Mr. Humphrey, in a communication to the writer, has furnished the following interesting history of his sheep, which shows that, although they may be correctly designated the Improved Hampshire Downs, they are yet *sui generis* and distinct from any others, and may be considered peculiarly his own :

"About twenty-five years since, in forming my flock, I purchased the best Hampshire or West-Country Down ewes I could meet with ; some of them I obtained from the late Mr. G. Budd, Mr. William Pain, Mr. Digweed, and other eminent breeders, giving 40s. when ordinary ewes were making 33s. to 34s., using the best rams I could get of the same kind until the Oxford show of the Royal Agricultural Society. On examining the different breeds exhibited there I found the Cotswolds were beautiful in form and of great size ; and, on making inquiries as to how they were brought to such perfection, I was informed that a Leicester ram was coupled to some of the largest Cotswold ewes, and the most robust of the produce were selected for use. The thought then struck me that my best plan would be to obtain a first-rate Sussex Down sheep to put to my larger Hampshire Down ewe, both being of the short-woolled breed. I thus determined to try and improve the quality and form of my flesh, still retaining the size and hardihood so necessary for our dirty low lands and cold exposed hills. With this object I wrote to Mr. Jonas Webb to send me one of his best sheep, and he sent me a shearling by his favorite sheep Braham, which made some good stock out of my large ewes. I

went down the next two years, and selected for myself; but the stock did not suit my taste as well as the one he sent me, and I did not use them. I then commissioned him to send me his sheep which obtained the first prize at Liverpool; and from these two sheep, the first and the last, by marking the lambs of each tribe as they fall, then coupling them together at the third and fourth generation, my present flock was made. Not having used any other blood on the male side for more than twenty years, I found some difficulty at first, when putting the first-produce ram to the first-produce ewe, the lambs coming too small to suit my customers. To obviate this difficulty I drafted out the finest and smallest-bred ewes, replacing them with the largest Hampshire Down ewes I could meet with that suited my fancy; still continuing to use the most masculine and robust of my rams to keep up my size. Some of my friends advised me to use a large coarse sheep to these small ewes to remedy the defect; but the larger ewe seemed to me the better way, and that course I pursued. I got rid of my smallest ewes and replaced them with large ones, which gave me what I thought to be an advantage—the using no male animal but of my own blood, the pedigree of which I am now acquainted with for more than twenty years. It has succeeded hitherto beyond what I could have expected. My object has been to produce a Down sheep of large size with good quality of flesh, and possessing sufficient strength and hardiness to retain its condition while exposed in rough and bad weather to consume the root-crops on our cold, dirty hills. Independently of the value of the Hampshire or West-Country Down in an agricultural point of view for such localities as ours, they produce when slaughtered a valuable carcase of mutton, giving the consumer a good proportion of flesh to the fat, which is a point that may be too much lost sight of. I will, in proof of it, relate an instance which a gentleman told me the other day. When residing in another county he sent to his butcher for 3 lbs. of mutton. The fat seemed so much out of proportion to the lean, that he had the curiosity to weigh the lean. After carefully cutting it out, he found it to weigh $\frac{3}{4}$ lb., or only one-fourth of the whole. This anecdote indicates to those who are attempting by crosses to establish a new breed, or to improve an old one, the importance of producing an animal in which the flesh forms a due and sufficient proportion of the whole.”

In Dorsetshire the same system has been pursued as in Wiltshire, although more recently and to much less extent.

In the eastern part of the county the Wiltshire system of crossing has been followed with still greater latitude. The object being to secure size without coarseness, the rams of the Hampshire as well as the Sussex are each used, as the fancy of the breeder may direct. In one flock, well known to the writer, of very good repute—so much so, that an annual sale of rams and ram lambs takes place, and for several years past has been very successful—the owner, whose flock was originally Southdown, has increased the size of his sheep by means of the Hampshire ram, but does not hesitate to avail himself of the Sussex from time to time to counteract, as he says, any tendency to sourness, and also uses the choicest of his own breed as well. Here is an evident cross, carried to a considerable extent and with great success, as the high price realized by the sale of fat tegs sufficiently testifies. Other breeders in this county adhere firmly to the Southdown, which they seek to improve by using first-class rams; and the superior quality of their fleece, as compared with the Hampshire, forms no small part of their motives for so doing. Some years since the Southdown sheep in Dorsetshire received a cross from the Devon or Bampton Nott, a large long-woolled sheep, but with a good disposition to fatten. The cross was approved of, and the produce were used by other flock-masters, which circumstance has perhaps rendered the Dorsetshire Southdown somewhat larger than the Sussex.

The *Dorset horned* sheep, so valuable for their early lambs, some fifty or sixty years since reigned supreme over the Dorsetshire Downs. They were then in many instances supplanted by the Sussex, which were found better suited for folding, and were more esteemed for their mutton. Crossing was tried in many instances, but although the half-bred lamb from the Dorset ewe was and still is in great request for early lamb, yet the breeds did not assimilate well; they were as a flock inferior to their parents, and were consequently discontinued; and whilst the Dorset held their own in the west, the Southdown took their place in the eastern part of the county, and of late years have, in many instances, been crossed by the Hampshire ram.

The Dorset horned sheep is, however, a much superior animal to the old Wiltshire and Hampshire. Shorter on the legs, with a more compact frame and a rounder barrel, this sheep, besides its peculiar value for the production of early lamb and its remarkably prolific qualities, is by no means to be despised for its feeding properties. It is not unusual for these sheep—as well as the kindred

though somewhat larger Somersetshire—to be brought into market in March and April, together with their lambs and sometimes pairs of lambs, all fit for the butcher at the same time. The Dorsetshire and Somersetshire sheep are raised on tolerably good land, where they have been preserved pure and improved by selection.* It is usual, however, to put the ewes that are intended to be sold to the Southdown ram, which improves the quality and fatting predisposition of the lamb, and the ewes are usually sold at the Hampshire October fairs, by which time they are very forward in lamb. The buyers of the ewes, although the usual custom is to sell off the ewe and lamb the following spring, sometimes keep a portion of the ewes another year, putting them again to a black-faced ram. It is remarkable that these ewes are not only exceedingly prolific and rarely have any mishap in yeanning their lambs, but will carry on all the functions of maternity whilst almost fat themselves. In South Hampshire, which is celebrated for the excellent quality of its early lamb, this system is carried out to perfection, particularly with the Somersetshire ewe. The drawback to this breed of sheep, as compared with the Hampshire and Southdown, is the longer period required for their maturity, the richer food required, and the somewhat inferior character both of the mutton and the wool.

To return, however, to our proper subject, we may observe that various attempts were made some years since to introduce the Merino blood, with the idea that great benefit would be derived from the increased quantity and the superior fineness of the wool; and undoubtedly, if the carcase of the Southdown and the wool of the Merino could be united in the same animal, the acmé of sheep-breeding would be attained. It was found, however, that the quality of the wool was not a sufficient recompense for the want of early maturity and feeding properties; and at length, after many trials, the Merinos disappeared by the continued use of other rams. It is very possible, however, that they may have left behind them some improvement of the fleece, for it is equally difficult in breeding to get rid of a virtue and to wash out a stain. We have confined our examples of cross breeding pretty much to the breeds of our own locality, but it must not be forgotten that other counties have also some noble specimens of cross-bred sheep. Shropshire is

* The Dorsetshire flocks have of late years been crossed and improved by the larger Somersets, so that pure flocks of the former are now rare, and the distinction of the two breeds by the color of the nose has almost disappeared.

celebrated for its breed of sheep, and under the new regulations they compete very successfully at our annual shows. At the Chester meeting they beat the Hampshire Down as old sheep, but in their turn were conquered by the latter in the younger classes. They present themselves to our notice in a more compact form ; though shorter, they are wider, broader on the back and deeper through the heart.

This breed was first brought into national repute at the Shrewsbury meeting in 1845, when it was wisely held that it was no longer desirable to confine the honors of the Society to a few particular breeds. The new class "Shortwools not Southdowns," brought into competition with each other, the Hampshire, the Shropshire, and the West Country Down or Wiltshire ; and thus, although the labors of the judges were rendered somewhat onerous, yet much good was effected, and the public have greatly appreciated and promoted the various breeds so brought into notice.

The Shropshire originally sprang from a breed called the Morfe Common sheep, and owe most of their great and improved qualities to careful selection. We imagine they would make a very good cross with the Hampshire Down, and might somewhat improve the carcase of the latter, as well as the quantity and quality of wool in the flocks of those breeders who do not attach too much importance to the color of the face.

The Shropshire speckled-faced sheep is undoubtedly a cross-bred animal, and indeed affords a striking example of the perfection that can be derived by a judicious mixture of various breeds. At a late meeting of a Farmers' Club in this county, Mr. J. Meire observed, "It is not attempted to be denied that the Shropshire is a cross-bred sheep ; the original breed was horned, and the first attempt at improvement was to get rid of these incumbrances, and there is little doubt that this was effected by a cross of the Southdown. This sheep was well adapted for the downs, but for the enclosures of Shropshire something more docile was required, consequently, recourse was had to the Leicester." This crossing and recrossing at length gave place to the practice of careful selection, and thus uniformity was sought for and attained, and the present superior breed was established. It is now held that no further cross is required.

The New Oxfordshire sheep is a very valuable breed, originating from a cross between the improved Cotswold and the Hampshire or West Country Down. Their size being less than the Cotswold,

they are better adapted for the ordinary management of a light land farm. This breed is very similar to that first introduced by Mr. Twyman, to which allusion has been made, but probably the Southdown has been used as well as the Hampshire Down.

Although Mr. Twyman may perhaps have a claim to priority in crossing the Hampshire Down ewe with the Cotswold ram, yet from various causes, and probably because the Hampshire hills were scarcely adapted for such large sheep, they failed to establish themselves in this locality; whilst a very few years afterwards a similar experiment was tried in Oxfordshire, and, whether from a milder climate, more fertile pasturage, or other causes, the result was a complete success.

Mr. S. Druce, of Eynsham, Oxon., favors the writer with the following short communication on the subject:

"The foundation of this class of sheep was begun about the year 1833 (see vol. xiv, p. 211,* of the Journal of the R. A. S. E.), by using a well-made and neat Cotswold ram with Hampshire Down ewes. At the same period several breeders of sheep in this neighborhood also tried the experiment; consequently there has always been an opportunity of getting fresh blood by selecting sheep which suited different flocks, and thereby maintaining the uniform character which is now established.

"As to the result of this crossing, I would refer you to the names of the following, who usually exhibit at the "Smithfield Club" Show, viz: Messrs. John Hitchman, Little Milton, Oxon.; Wm. Gillett, Brize Norton, Witney, Oxon.; W. Hobbs, Minsey Hampton, Gloucestershire; A. Edmunds, Longworth, Berks; J. B. Twitchell, Wilby, Northamptonshire; C. Howard, Biddenham, Beds; William Hemming, of Caldecot, near Moreton-in-the-Marsh, Gloucestershire, &c., &c. And amongst ram breeders I would name J. Hitchman, J. Roberts, C. Gillett, W. Gillett, J. Bryan, His Grace the Duke of Marlborough, H. L. Gaskell, Esq., H. Barnett, Esq., all in this neighborhood, and who offer sheep by auction the second Wednesday in August annually at Oxford."

* In the communication referred to, Mr. Druce gives a table, showing his ideas of the comparative value of the different breeds of sheep, the result of which is in favor of the cross-bred. He adds, "With ordinary skill in sheep-farming, I find no difficulty in keeping the form and size of the animal as it should be; the wool of a valuable quality, and not deficient in quantity; and I maintain that the good qualities can be better secured by employing the cross-bred animals on both sides than by confining the practice to the first cross."

There are few districts in England in which some advantage has not been derived from the cross breeding of sheep. Even the little *mountain sheep* of Wales has been greatly improved by the *Cheviot* ram, a larger, superior, but still a mountain sheep. At the same time the Cheviots themselves have been improved for the butcher by crosses with the Leicester, the Cotswold, and the Down. The progeny have been increased in size, and fattened more readily. This breed has also been considerably improved by selection.

The *black-faced heath* breed, too, so well suited to mountainous districts in which heath abounds, whilst it has been supplanted in certain districts by the Cheviot, has, in other heathy localities, displaced the latter. Although very slow in reaching maturity, the mutton is much esteemed; and the lambs, from a first cross with the Leicester ram, fatten readily when removed to more favorable pasturage than the native habitat of the breed.

The testimony in favor of the advantages to be derived from the cross breeding of sheep when the purpose sought for is limited to the first cross is so strong that, however forcible may be the arguments of the advocates of pure breeding with reference to stock sheep, they sink altogether in weight when sheep for the butcher are concerned. We have noticed the advantageous custom of crossing the Dorset and Somersetshire ewes with the Down ram, thereby improving both the quality and the disposition to fatten of the lambs, whilst the early lambing and nursing qualities of the ewes are equally secured.

In Norfolk an intelligent and experienced correspondent assures us that cross breeding is of the utmost importance to the light land farmers, and that the crosses most esteemed are the Southdown and the Hampshire ewes crossed with the Leicester and the Cotswold ram, by which earlier maturity is secured, together with an increase both of wool and mutton. The cross between two comparatively pure breeds is most esteemed. Most of the graziers in the locality of the writer (Mr. Coleman) speak strongly in favor of the first cross, as possessing both early maturity and a propensity to fatten. The inconvenience of the system is the necessity induced either of selling out every year, or otherwise of keeping up a pure flock, in order to afford materials for crossing. It may be observed that although generally, for the purposes of the butcher, a ram of a large breed is necessary, this is not essential when a permanent improvement is sought for; improved shape and superior quality often follow the ram of a smaller breed. Many owners of

sheep, whose flocks were originally cross-bred, declaim very forcibly on the evils of crossing and the necessity of pure breeding.

We cannot do better, in concluding our paper, than gather up and arrange in a collected form the various points of our subject, which appear to be of sufficient importance to be again presented to the attention of our readers. We think, therefore, we are justified in coming to the conclusions :

1st. That there is a direct pecuniary advantage in judicious cross breeding ; that increased size, a disposition to fatten, and early maturity are thereby induced.

2nd. That whilst this may be caused for the most part by the very fact of crossing, yet it is principally due to the superior influence of the male over the size and external appearance of the offspring ; so that it is desirable, for the purposes of the butcher, that the male should be of a larger frame than the female, and should excel in those peculiarities we are desirous of reproducing. Let it be here, however, repeated as an exceptional truth, that though as a rule the male parent influences mostly the size and external form, and the female parent the constitution, general health, and vital powers, yet that the opposite result sometimes takes place.

3d. Certain peculiarities may be imparted to a breed by a single cross. Thus, the ponies of the New Forest exhibit characteristics of blood, although it is many years since a thorough-bred horse was turned into the forest for the purpose. So, likewise, we observe in the Hampshire sheep the Roman nose and large heads which formed so strong a feature in their maternal ancestors, although successive crosses of the Southdown were employed to change the character of the breed.

It has been asserted by some observers, that when a female breeds successively from several different males, the offspring often bear a strong resemblance to the first male ; which is supposed to arise from certain impressions made on the imagination or nervous system of the female. Although this is sometimes or often the case, we doubt very much whether it is so frequent as to be considered as a rule.

4th. Although in the crossing of sheep for the purpose of the butcher, it is generally advisable to use males of a larger breed, provided they possess a disposition to fatten, yet, in such cases, it is of importance that the *pelvis* of the female should be wide and capacious, so that no injury should arise in lambing, in consequence of the increased size of the heads of the lambs. The shape of the

ram's head should be studied for the same reason. In crossing, however, for the purpose of establishing a new breed, the size of the male must give way to other more important considerations; although it will still be desirable to use a large female of the breed which we seek to improve. Thus the Southdowns have vastly improved the larger Hampshires, and the Leicester the huge Lincolns and the Cotswolds.

5th. Although the benefits are most evident in the first cross, after which, from pairing the cross-bred animals, the defects of one breed or the other, or the incongruities of both, are perpetually breaking out, yet, unless the characteristics and conformation of the two breeds are altogether averse to each other, nature opposes no barrier to their successful admixture; so that, in course of time, by the aid of selection and careful weeding, it is practicable to establish a new breed altogether. This, in fact, has been the history of our principal breeds. The Leicester was notoriously a cross of various breeds in the first instance, although the sources which supplied the cross is a secret buried in the "tomb of the Capulets." The Cotswold has been crossed and improved by the Leicester; the Lincoln, and indeed all the long-woolled breed, have been similarly treated. Most of the mountain breeds have received a dash of better blood, and the short-woolled sheep have been also generally so served. The Hampshire and the present Wiltshire Downs have been extensively crossed; the friends of the Shropshire cannot deny the "soft impeachment"; and the old black-faced Norfolks have been pretty well crossed out altogether. The Dorsets and Somersets remain pure as a breed, although they are continually crossed to improve their lambs. The Southdown is perhaps one of the purest breeds we have. No one asserts that the immense improvement of this breed by Ellman was due to any crossing; whether the increased size and further improvement which it has received in other counties have been effected in all cases without a cross of any kind, may be in the minds of some a matter of doubt; yet it is only right to give the arraigned, in the absence of any proof to the contrary, the benefit of such doubt, and consider them still as pure as ever.

We confess that we cannot entirely admit either of the antagonistic doctrines held by the rival advocates of crossing and pure breeding. The public have reason to be grateful to the exertions of either party; and still more have they respectively reason to be grateful to each other. We have seen that Mr. Humphrey cheer-

fully acknowledges the benefit he derived from Mr. Jonas Webb's rams. Had he grudged the expense of seeking his improvements from such a renowned flock, and been satisfied with inferior rams, he would not have achieved the success which has crowned his exertions. So likewise with the new Oxfordshire breed. What matters it whether the localities occupied by these sheep were divided between their ancestral breeds or occupied as now by their cross-bred descendants: the public is benefited by having better mutton than the Cotswold alone would furnish, and more valuable wool than the Downs could supply; whilst the breeders, finding their account in their balance-sheet, have very properly perpetuated the breed which has paid so well. Our purpose has been to hold the scales fairly between both systems, having no prejudices to serve. Thus, in defending the system of crossing from some of the objections that have been urged against it, we have no wish to be thought forgetful of the merits of a pure breed; on the contrary, we would instance with pleasure the remarkable success that has attended the careful selections which in the hands of Mr. Merson, of Brinsworthy, near North Molton, Devon, has brought out the capabilities of the little Exmoor sheep to an amount of excellence which no inspector of the ordinary breed would have believed them capable of attaining. But whilst this instance proves how much can be done by careful selection, vigorous weeding and pure breeding, and conveys a warning to any rash and heedless practitioner of crossing, yet, if we regard it as a bar against the system, we deprive by anticipation the spirited introducer of this great improvement of the fair reward for his labors which he has a reasonable prospect of obtaining from the proprietors and improvers of other mountain-breeds.

Although the term *mongrel* is probably correct as referring to a mixed breed, yet, as it is generally used as a term of reproach, it should not be fairly applied to those recognized breeds which, however mixed or mongrel might have been their origin, have yet by vigilance and skill become in the course of years almost as marked and vigorous and distinctive as the Anglo-Saxon race itself, whose name we are proud to bear, and whose mixed ancestry no one is anxious to deny.

Let us conclude by repeating the advice that, when equal advantages can be attained by keeping a pure breed of sheep, such pure breed should unquestionably be preferred; and that, although crossing for the purposes of the butcher may be practiced with im-

punity, and even with advantage, yet no one should do so for the purpose of establishing a new breed, unless he has clear and well-defined views of the object he seeks to accomplish, and has duly studied the principles on which it can be carried out, and is determined to bestow for the space of half a lifetime his constant and unremitting attention to the discovery and removal of defects.

ON CROSS-BREEDING IN HORSES.

Some time since I discussed the subject of cross-breeding in the pages of this Journal, vol. xx., with more particular reference to the breeding of sheep; my paper excited some little attention, and I had no reason to complain of the criticism it received. In the meantime, I have seen no cause to doubt the truth of the principles then advocated, or the facts adduced in their support. I propose, therefore, at the present time, to show the applicability of those principles to the horse, more particularly to the saddle-horse, and I hope to illustrate this branch of the subject with equally strong examples. Among the points I sought to establish were the following: That the influence of the male or female parent is not capricious; but yet not always alike; in the majority of instances the male parent governs the size and external shape of the offspring (particularly in the back and hind-quarters), whilst the female influences the constitution, the nervous system, and often the head and fore-quarters—the case being, however, occasionally reversed. That this combination, which may be more of a mechanical than a chemical union, by no means implies such an equal division of influence, as the mingling of two fluids, in which case the offspring would be unlike either parent, but a *juste milieu* between the two, and there could be no handing down of type from one generation to another. It is rather such a fusion of two bodies into one that both defects and high qualifications are passed on from parent to offspring with a sort of regular irregularity, resembling the waves of the sea—each parent having the remarkable power of propagating ancestral peculiarities, though latent in itself. Thus it is that strong characteristics are handed from one generation to another; so that if we seek by careful selection to remove a defect or propagate a good quality, we may calculate that a large number, perhaps the majority of the offspring, will meet our wishes, and by weeding out the remainder and pursuing this course for several generations we

may accomplish our design. This view will further explain how it is that defects not seen in the first cross, being kept down as it were by the superior influence of the improving parent, re-appear in the next generation, and serve to deter timid breeders from continuing the experiment, or arm the opponents of crossing with strong but fallacious arguments against going beyond the first cross.

I pointed out that, owing to the superior influence of the male parent, the effect of the first cross in sheep was very considerable, bringing greater size, often longer wool, earlier maturity, and a propensity to fatten; or, in other cases, superior quality of mutton. Many persons who go thus far are deterred from going any farther by the very numerous failures which result from pairing together animals of the first cross, and consider that pure breeds only should be perpetuated; I adduced, however, various examples to show that crossing might be carried much farther, even to the extent of establishing altogether a new breed, possessing qualifications which, although derived from them, yet neither of the parent breeds alone exhibited. I instanced the cases of the Improved Hampshire, the New Oxfordshire, and the Shropshire, and more particularly the flocks of Mr. Humphrey, as affording successful illustrations of the practice.

Special reference was made to Mr. Humphrey, who, starting with two of Mr. Jonas Webb's best prize Southdown rams, kept steadily to sires of his own stock, occasionally purchasing fresh Hampshire ewes, until in the course of 20 years he had established a first-rate breed, all of which were descended on one side from Mr. Jonas Webb's Southdowns. This example, as well as that of Mr. Rawlence of Wilton, who now scarcely ranks second to Mr. Humphrey, seems to show that the use of males and females possessing a similar amount of breeding is much more to be depended on than the system pursued by others who cross with the Sussex when their sheep are getting too strong or coarse, and with the old Hampshire when they are getting too small.

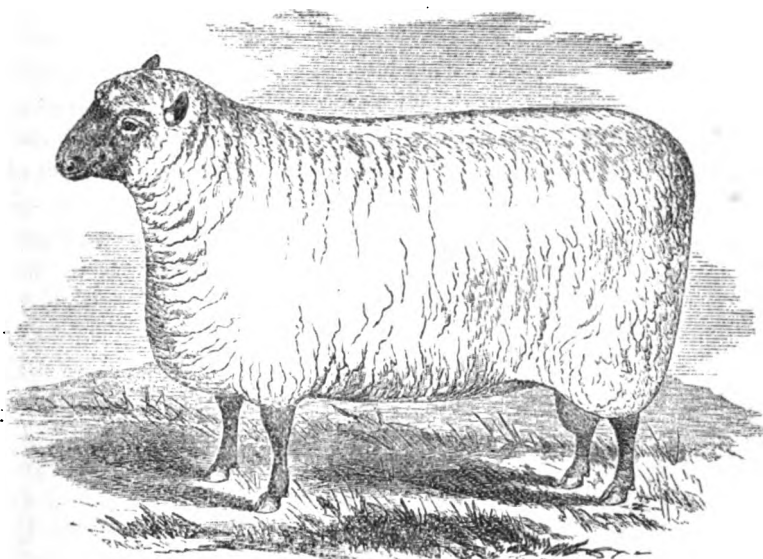
I now further propose to inquire whether this system, which is so successful with sheep, is one altogether to be condemned with horses; always assuming that cross-breeding, to be successful, must be undertaken with a distinct and defined object, and assigning the highest praise and the first rank to those who maintain intact the purity of our best established breeds.

An opinion is very commonly entertained that there are only two pure breeds of horses in this country (ponies excepted), viz :



SOUTH DOWN EWES.

The property of H. G. White, South Framingham, Mass.



SOUTH DOWN RAM, "SON OF ARCHBISHOP."

The property of H. G. White, South Framingham, Mass. Son of Archbishop was winner of the first prize as two-year-old, at the show of the New England Agricultural Society, at Concord, N. H., in Sept., 1863. Sire, "Archbishop," bred by the late Jonas Webb, Exmouth, England, and imported by Samuel Thorne, Dutchess County, New York. Dam, an imported Webb ewe by "Reserve."

the thorough-bred and the heavy cart-horse,—all the rest being but modifications of these races in various degrees. It is, however, probable that long before either of these extremes were known among us there existed a native breed of a very useful kind, pure examples of which are now scarcely to be met with. The *pack-horse* with his drooping hind-quarters, good shoulders, strong fore-legs, and sure action, existed in England for centuries before the Barb and the Arab were imported for the chase or the race-course by the Stuarts, or the introduction of carriages had led to the use of Flanders mares, brought from the neighboring continent; these heavy horses, with their high action, slow but sure and staunch, being naturally much prized for helping the ponderous coach out of the deep ruts of the high roads or along the miry lanes. The heaviest of the race were greatly in demand not only for tilling the strong lands but for drawing the cumbersome road-wagon before even the six-mile-an-hour luggage-van was introduced as a novelty and an innovation. I have before me one of Morland's striking sketches which reminds me forcibly of my boyish days, when the slow but sure approach of one of these ponderous vehicles with its eight or twelve ton load, heralded perhaps by a cloud of dust ever stirred up by the heavy feet of the ten or twelve massive animals that moved it onward at the rate of some two miles an hour, never failed to command attention. It was a sight to behold these leviathans settle into their work after a short respite in the midst of a steep hill: the burly wagoner, too heavy to walk, and scorning to ride in his wagon, was mounted on one of those strong sure-footed ponies, usually white or pie-bald, which have long since disappeared. A crack from his long whip would send into the collar with a 20-horse power the ten hairy-legged but powerful brutes whose broad backs were rendered still broader in appearance by the absence of tails, for each horse was docked close to the stump, under the absurd idea that their strength would thereby be increased.

It is difficult to imagine that this wagon, which seemed to the people of the day to be one of the institutions of the country, was itself formerly looked on as a newfangled novelty, which superseded the once universal, now well-nigh forgotten pack-horse.

There are but few specimens remaining of the pure pack-horse breed which has been quite neglected and overlooked by agricultural societies; and, consequently, whilst the mares have for a while proved valuable for breeding half-bred hunters with the thorough-

bred horse, the males have been gelded and used up. This original or ancient race has no doubt been modified considerably in size, according to the fertility of the soil on which it might be raised; being sometimes developed into the strong upstanding harness-horse, and at others dwindling down to the plain but useful gallopway, as seen in many remote districts, and particularly in the little horses used in the Irish cars. The Welsh pony and the Clydesdale cart-horse, the latter enlarged by rich pasturage and perhaps a cross, probably represent the opposite extremes of this same breed.

In less civilized ages the most useful horse was that which could most readily be adapted to all purposes; and there is no good reason why, even in modern days, the more ancient breed, equally pure and more serviceable than the blood-horse or dray-horse, should be altogether neglected, not only by our sporting men, but by the patrons of our agricultural societies; particularly since magnificent hunters have been the result of the cross between the thorough-bred horse and the old pack-horse mare. It will be useful to point out the peculiarities which distinguish the two breeds, with a few explanatory remarks on the component parts of the animal which by their varying proportions constitute these peculiarities.

The skeleton is formed of bone, which owes its solidity to the fact that it is composed of one-half or upwards of earthy matter, so deposited in cartilaginous cells as to render the bones strong and resisting, and adapted not only to support the weight of the animal, and to protect from injury the vital organs, but to serve as a framework for the attachment of muscles, sinews and ligaments. The bones of the limbs are for the most part cylindrical, and motion is effected by means of joints at the extremities of the bones, which are secured by powerful non-elastic ligaments. The bones are much smaller in the thorough-bred than in the cart and intermediate breeds, though generally more compact, and the joints also are by no means so wide, but admit of more longitudinal motion. With this diminished size there is, of course, less surface to sustain the weight of the body.

The sinews resemble the ligaments in appearance, and like them are non-elastic; they are attached to the bones, and serve to communicate motion to them from the muscles to which they are joined or from which they appear to spring. Both ligaments and sinews are smaller in the thorough-bred than in other horses. The

muscles and the flesh are the same, and are the seat of the motive power, motion being produced by the contraction of the fibres of which the muscles are composed. The strength is the result both of the size and the number of fibres, whilst the extent of motion depends on the length of the muscles and their fibres. Of course the length of the bones corresponds to that of the muscles, and although the joints in the thorough-bred have less surface, they admit of more motion.

The pack-horse may be thus described :—The prevailing colors of the breed were bay and brown, which, with the usual accompaniments of black legs, denoted a good and hardy constitution, yet other colors, such as greys and blacks, were to be found occasionally. Among the chief peculiarities were the good and flat fore-leg with its well-developed back sinew or flexor tendon, the good and sound foot, and capital shoulders and fore-hand. The neck muscular but not thick and heavy, was fairly arched, and the head, of moderate size, was well set on. This form was accompanied, as we might expect, with good and safe action in the walk and trot; the horse rarely stumbled, and only fell from overwork and exhaustion. While the heavier and coarser specimen of this breed was capable of carrying his five-hundredweight load throughout a long journey, the lighter and more active was used as the ordinary saddle-horse or even as the hunter of the day. Many of these animals were extraordinary trotters, and, as good trotters are generally good walkers likewise, the quality was greatly prized and encouraged; and thus a race of trotters was bred which, no doubt, were the ancestors of the celebrated American trotting-horses, such as the "Tom Thumbs" of later days. Although these horses were deep in the chest and ribs, the hips were often ragged, the tail set on low, and sometimes the hocks were rather too straight. The celebrated trotting-horses of Norfolk were evidently not true pack-horses, although perhaps allied to them; they had, no doubt, a touch of Spanish blood, and possibly of the thorough-bred.

Let us now, as a contrast, glance at the peculiarities of the thorough-bred horse. Racing, no doubt, existed in this country long before, but received a new impetus from the introduction of the Barb, the Arabian, and the Turk. The sires which were at first imported, quickly established the great superiority of the Eastern blood as regards speed, and when mares followed at a later date in

smaller numbers, they no doubt still further added to the speed of the English racehorse.

The modern blood-horse is of much greater average size than the Arab or the Barb either of the present or the past; and a doubt exists whether this is entirely due to selection and nurture, or in part to the early crossing with the native mare; in any case, it cannot be denied that every thorough-bred horse in the kingdom, from the highest to the lowest, is to the extent of more than nineteen-twentieths descended from the Eastern horse. This foreign influence was not, however, derived from one strain only, for the pedigree of 'Eclipse' himself shows that besides his descent from the Darby *Arabian* and Godolphin *Barb*, he had five or six crosses of the *Turk*; and we have a strong conviction that the improved native horse, made up of the ancient British, the Spanish, and the Barb, is entitled to some share in the honors of his parentage. Be this as it may, the present English thorough-bred horse has proved himself faster than any of the breeds from which he is sprung; and although many doubts have been cast of late on his powers of endurance in comparison with the smaller horse of some fifty years ago, and the practice of training and racing has been severely criticised, yet there is good reason to suppose that our first-class winners are as stout as most of those which have preceded them.

The thorough-bred English horse, in common with the Arabian, possesses no doubt more muscular vigor, as well as nervous energy, than other kind of horse.* In addition to this he has a deep chest capable of admitting the large amount of air which the demands of the system require under severe exertion. By natural conformation and by artificial training all superfluous weight is removed, and thus he is capable of covering more ground in his stride, and

* From time to time it has been suggested, with the view of improving our breed of thorough-bred horses, and particularly their staying qualities, to resort again to the original or parent breeds; but not to mention the ill-success of such attempts when made, it must be evident that the tendency of this cross would be to diminish the size and to shorten the stride, and probably to render the action too high; we can therefore scarcely expect breeders for the turf to adopt the advice. At the same time it must be acknowledged that the Arab has been more successful with half-bred and under-bred mares than the third class cast-off racer, inasmuch as with undeniable bottom there has been a hardier constitution, better forelegs, and higher action from this cross. Where the dam has been of sufficient bone and size, many good hunters and handsome harness-horses have been so bred, and still more frequently capital ponies and galloways; indeed, this is one of the best modes of improving the breed of ponies. Arabs have, in proportion to their size and weight, larger bone and sinew than the majority of our thorough-breeds, and I have often observed their beneficial influence in the second and third generation both with hunters and other horses.

of repeating these strides more frequently than any other horse, as well as of continuing his extreme efforts for a longer period without tiring. The heart and the brain of such a horse are comparatively larger than in other breeds, the bones, though smaller, are more compact, the skin of a thinner and finer texture, and the blood-vessels more developed. These advantages, however, are not without certain drawbacks. The delicacy of the skin causes the animal to be extremely susceptible of cold; he is consequently less hardy and requires more food to keep up the animal temperature, so that it is difficult to keep flesh on a thorough-bred horse unless he is kept warm; moreover, the carcass being smaller, the stomach and intestines are not so large, and consequently the food must be more concentrated and nutritious to keep up this supply of warmth.

The difference as respects hardiness is strikingly shown between the foal of the cart-mare and the thorough-bred. Whilst the former is strong, sturdy, and fleshy, the latter is comparatively puny, thin, and susceptible of the least cold; the former, by means of the dam's milk, can be kept in first-rate order, whilst the latter requires artificial assistance as soon as it can be rendered. The fact is that the digestive apparatus is more powerful in the one than in the other—it can assimilate more nutriment from nutritious food, and subsist on rough diet on which the other would starve. This it is which renders it so expensive to rear the blood-colt, and this distinction prevails throughout life, and extends in a lesser degree to the half-bred, as compared with the cart-horse. The thorough-bred horse has yet other faults; as a rule, he is slighter and weaker in the fore-legs, he goes closer to the ground, is often a bad walker and indifferent trotter, and is more liable to stumble and fall than the coarse-bred horse. How can it be otherwise? He is bred to win a race, from parents who have been winners; the elevated and rounded action that makes a good hack or charger, would shorten his stride and impair his chances; although if he has good legs and sufficient size and substance, the very fact of his being too slow for racing ought to be rather a recommendation as a hunting stallion than otherwise, yet who would give him credit for stoutness if he had never been fortunate enough to win a race; or what chance would he have for a prize at our agricultural shows when judged by those who can recognize at a glance a Derby favorite, or the winner of the St. Leger?

The term *stoutness* in racing phraseology means endurance con-

nected with speed ; it has nothing to do with size and weight, as a tyro might suppose ; a great horse is often speedy but a craven at heart, while most of the stoutest race-horses of the last century were little more than galloways in size, and such too are the untiring Arabs of the Desert. No judge, therefore, can tell a stout horse by his appearance—it is necessary to know his performances before this can be determined ; for, however perfect the symmetry and powerful the frame, if he is only good for a mile he is not stout.

The improvement effected in the size and probably in the speed of the thorough-bred horse is no doubt very great, and every year produces some wonderful examples of first-class winners ; yet I will venture to say that nowhere else throughout Nature where the same care and vigilance is bestowed on the rearing of animals, are the blanks so many and the prizes so few. To justify this perhaps startling assertion, let us endeavor to trace the career of the, say, fifteen hundred or more thorough-bred foals which are annually dropped. These foals are reared from mares of undeniable pedigree, and for the most part of good size, very many among them being winners. The majority are begotten by first-class horses, who have either been great winners themselves or have beat great winners before they have themselves broken down, or, better still, have proved themselves the sires of great winners as well as winners themselves. Both care and expense are lavishly bestowed on the fifty or sixty sires, the two thousand brood mares, and also on the foals themselves as soon as they are dropped. The dam's milk is sustained with the most nutritious food, and the foal is fed with the best as soon as it can masticate. It is an error to suppose that either the mare or the foal is pampered or enervated by undue care ; the well-kept paddock affords every facility for taking exercise, and those who have witnessed the sprightly and incessant gambols of the young animal will acknowledge that the muscles and sinews of the thorough-bred foal are called into play much more than those of the cart-horse. Yet, with all this care, what becomes of these costly toys ? The greater number go into training at two years old or earlier, no small percentage having previously disappeared from disease or accident, and very many succumb to the numerous maladies and mishaps that occur in the training stable. After this ordeal the trials begin ; and then some are condemned as too slow and others as too small, some are mercifully shot out of the way, others submitted to the auctioneer's hammer, and many

a colt that has cost £200 to rear is sold for less than £10, and perhaps is dear at the price. The majority thus sold are colts and fillies that have never raced, many have given way in the joints or sinews, while some are rejected for their shortcomings in the actual race as two year olds, although many a horse which was unsuccessful at that age has proved a prize winner afterwards. It is difficult to say how many of those foaled actually make their appearance on the race course, but the difference in numbers between the entries and the starters for the Derby will afford some slight criterion. At all events, a little reflection will satisfy us that the number of first-class, or even second-class, horses annually brought to maturity is very small, and justify our assertion that the blanks far outnumber the prizes.

How can we explain such a falling off, that the offspring probably to the extent of 70 per cent., should prove inferior to both the sire and dam? The answer may be found in the fact that although our first-class race-horses are large and powerful animals, yet they are descended from ancestors considerably smaller than themselves, and Nature makes a constant effort to return to the original type. But for this natural law there is no telling what size our thoroughbred horses might reach, for the constant effort of the breeder is to raise large colts, and it is almost an axiom with many men that although a good *little* horse is all very well, a good *big* horse is a great deal better. In fact, the little horses, which are sometimes greater winners, are rather low than small, and usually have considerable length of muscle as well as depth of chest and substance, to compensate for their want of height. When, therefore, there are such constant efforts to outstep Nature, we cannot wonder that failure should be so frequent a result.

There is a striking contrast between Derby horses and their numerous relations who figure at country races, and when the short racing-career of these large colts is over and they are devoted to the stud it is astonishing how large they become and how much they girth.* They look the very incarnation of vigor and of strength, and it is probably their look that induces so many

* Although as a rule half-bred and three-parts-bred horses have more bone, and are larger in the girth than thorough-breds, yet the latter increase surprisingly in girth when thrown out of training and devoted to the stud. My friend Mr. Barrow, Veterinary Surgeon, of Newmarket, has kindly furnished me with the measurements of a number of first-class stud-horses now under his care at Newmarket. Amongst others "Longbow," "Toxophilite," "Thunderbolt," and "Muscovite," all of whom were upwards of

breeders to think that from such a sire any amount of substance can be secured which can reasonably be expected in the weight-carrying hunter. They forget, however, how large a percentage of their progeny are but "weeds," even when these sires are put to picked thorough-bred mares; and how very rarely the services of a horse of this stamp can be secured for half-bred mares. The great bulk of travelling thorough-bred stallions must necessarily be third-class horses, long in the carcass, long in the legs, weak in the sinews, unfit for any other purpose than the stud; and such are the horses that assist in deteriorating our breed of saddle-horses, and render horse-breeding so frequently unprofitable.

Let it not, however, be supposed that I undervalue the importance of "blood" in the hunter, the hack, and the harness-horse; I only dispute the doctrine that we should rely mainly or solely on the sire for its introduction, and then only for the first cross. It is a well-established fact, that the Eastern blood amalgamates with the native breeds of the country extremely well; it can be traced in the form, and still more in the courage and endurance, even in the third and fourth generation.

I must now call attention to the general principles of cross-breeding, viz., that while the male governs the size (not mere height,) the vital functions and the nervous system are influenced most by the female. If there be any truth in this doctrine, it must be as essential to attend to the pedigree of the mares as to that of the sire. But here all is left to chance; and whether she is taken from the plough-tail, the van, or the omnibus, no matter, so long as the sire is thorough-bred. Let us consider how the system works on some of our best mares. A farmer has a valuable mare that has been tested by many an arduous run. She is by a thorough-bred horse out of a half-bred mare, and, valuable as she is, she is a shade too light, or, at any rate, would be worth more money if she were equal to a little more weight. He is induced to put her to a thorough-bred horse, and the progeny is, of course, seven-eighths thorough-bred, but, according to my experience, mostly an unprofitable weed. We might go a step further back,

16 hands, and exceeded 6 feet in girth, and measured on the average 8 inches round between the knee and the fetlock. The chest of the thorough-bred is always comparatively deep and capacious. Mr. Barrow considers that the capacity of the chest increases after serving mares and from wearing no rollers, or anything to interfere with the proper expansion of the chest. It must be borne in mind that the horses here mentioned are peers of their order.

to the stronger half-bred mare, and trace the process of deterioration further ; but the final issue is the same—the propagation of a race of weeds. This is the real root of the evil which is affecting our breeds of horses,—an evil not to be remedied by the abolition of two or three-year-old races, or by the substitution of longer distances, or by any of the many suggestions with which, when political intelligence flags, our daily papers teem. Races for two-year-olds may be objectionable or otherwise, and eight-mile gallops may be excellent or cruel ; but, so long as racing is supported by the public as a pastime, the former will not be abolished nor the latter restored.*

Do away with the excitement of the struggle, and by greatly lengthening the race render its finish the slowest part of the contest, and people will be contented to read the result in the newspapers at home. Let us suppose that the racing of two-year-olds was altogether abolished, and that the Derby was contended for by four-year-olds, what would be the result? The expense of keeping race-horses would be enormously increased, perhaps to the extent of 100,000*l.* per annum.* And after all, even if these innovations could be introduced, they would altogether fail in their professed object—that of improving the stoutness of the thorough-bred horse.†

We frequently hear of horses that are very speedy for a mile, but fail altogether in a longer race. Now, on what does this want of stamina or stoutness depend? and, secondly, can it be discovered or ascertained by the external conformation of the animal? The speed of the horse depends on the length of the stride, and the

* The system of racing at two years old, whilst it is always trying and often fatal to the fore-legs and joints of the young animals, does not appear to be injurious to the constitution ; for we have numerous instances of famous stud-horses living to a good age, although they have raced thus early. That stout and successful sire the "British Yeoman," the winner of the first prize at the Royal Agricultural Society's Show at Chelmsford in 1856, fourteen years previously had won four large stakes as a two-year old, and the following year ran fourth for the Derby.

† If some of our stoutest thorough-breds have been discarded in consequence of their not being speedy enough to win short races, what has become of these horses, whose services would have been so valuable for half-bred mares? I rather believe that speed and stoutness are mostly combined in great winners, as in "Eclipse" and "King Herod" of old, and, at the present day, in "Stockwell" and "Blair Athol," the latter of whom unquestionably won his great races by his stoutness, for he was probably equalled in speed for half the race by several of his competitors. Surely the St. Leger, and other still longer races, must in nine years out of ten be won by stout horses, and as such horses are always used for the stud afterwards, they must have handed down to their posterity their stoutness as well as their speed.

frequency or rapidity with which these strides can be repeated, and in proportion to these efforts is the demand made on the organs of respiration and circulation and on the nervous system. Excessive speed is, therefore, in itself one cause of its short duration, inasmuch as it exhausts the vital powers. In many cases the locomotive and vital powers may not be well balanced: the former may be those of a first-class, and the latter those of a second-class animal. To a certain extent this want of bottom can be ascertained by the conformation, but to a certain extent only. If the horse is very leggy, light in the carcass, and narrow or deficient in depth of chest, the probability is that he is speedy, but not enduring. Sometimes, however, an animal shows none of these faults of form, and yet, though speedy for a mile, is unable to "stay." The cause is here, no doubt, beyond our ken; though it is, no doubt, due to deficiencies in the vital and nervous systems, and especially to the latter. To discover its existence, we presume, is the object of the advisers of four and eight mile races.

In the absence of proof, we much question whether the first-class race-horses of the present are inferior in endurance to those of former days. Why should they be so? They are descended from the best mares and the best horses, which have no doubt handed down with their speed that endurance and strength of constitution which contributes so much to make a winner. Want of endurance is not the defect of this race; put a feather-weight on the back of a weed, and in a light country he will probably beat the most valuable half-bred hunter, even in a long run; and yet with all this he is nearly valueless.

Next to the very first-class race-horses—the twenty prizes amongst a thousand blanks—there is no kind of horse of which this country has such reason to be proud as the half-bred, three-parts, and seven-eighths bred hunters, the highest combination in nature of strength and speed. Deriving speed and courage from their eastern progenitors, bone and substance from their northern ancestors, and action in all their paces from the blending of the two races, they are nearly perfect and decidedly most generally useful.

When a breed of sheep or of bullocks has reached this point, we seek to perpetuate their excellences by consorting parents who on both sides possess them, avoiding, of course, too great consanguinity. We do not resort, as a rule, again and again to the original breeds from whence the improvement has been built up.

Why, then, should horses be an exception to this rule? Why, although the mares of this stamp are considered well adapted for breeding, are the males condemned to be castrated, as unfit for that purpose? By such practice we not only lose the services of the males in transmitting their good qualities, but deprive one-half the mares of the opportunity of breeding animals as strong and valuable as themselves. The practice is, no doubt, in many respects a matter of convenience; for weight-carrying hunters are more tractable, and always, as geldings, command good prices; whilst it is hard to compete with the constant supply of ready-made stallions—good, bad, and indifferent—from racing stables, so long as their friends and owners can persuade breeders of horses and agricultural authorities that the goodness of the fore-legs is of little account, or that a bad thorough-bred stallion is better than a good half-bred.

Referring again to the general principles which have been laid down respecting the influence of either parent on the offspring and considering that the temper, nervous system, vital powers, and constitution, usually follow the dam, if the question be put, "Give a certain amount of breeding, which side would you prefer it to come from?" we unhesitatingly say, if it cannot be had from both sides, by all means let us have it from that of the dam, that her courage, nervous system, and vital powers may be, if possible, joined with the great bone and sinew of the coarser sire. If this system were more frequently pursued, we might breed weight-carrying horses from well-bred though rather light mares, and sometimes even from the best of the three and four year old mares cast out of the racing stable as not being good enough. By such means our cavalry would be far better mounted than at present, and we might, without difficulty, retain just as much breed as is requisite and desirable.* I do not, however, recommend such violent crosses as that of the cart-stallion with the thorough-bred

* An inspection of our cavalry regiments will strikingly illustrate the evils of the present system. I had an opportunity a twelvemonth since of looking over a rather large number of cast cavalry-horses offered for sale by auction in a garrison town, and found that nineteen out of twenty were extremely faulty. In most, although the carcasses were sufficient, the legs were totally unfit to carry the weight a cavalry horse is called upon to sustain. Crooked legs, weak sinews, deficient bone, small joints, sickle hocks, the evident result of the union of the two bodies of a thorough-bred horse and a coarse or cart mare, was almost the universal rule; and they presented a strong contrast to the animals that in my experience used to be cast some thirty years ago when half-bred stallions were far more numerous than at present, and horses were bred from parents possessing on both sides the qualifications sought to be perpetuated.

mare, though not unfrequently successful; or the reverse case, which, with a few noted exceptions, produces more failures.

As examples are always more telling than precepts, I propose to adduce a few instances of successful breeding with half-bred horses and well-bred mares.

To begin with my own experience. I rode a mare for some twelve years without her making a mistake; she was good in all her paces, a fair hunter, an excellent jumper, and a capital hack. She was bred by my father out of a three-parts-bred mare (a good hunter) by a young half-bred horse, pedigree unknown or forgotten. Her dam afterwards bred three other colts by thorough-bred sires, none of which proved of any value. They could not carry weight, and none of them paid the expense of breeding.

2. A rather heavy but active and useful cart-mare, belonging to the same owner, bred two colts by thorough-bred horses, neither of which repaid expenses: they had the bodies of the dam and the legs of their sires.

3. One of my friends had, some years since, a splendid trotting mare that he justly regarded as a pearl of great price, for she had substance, showed plenty of breed, and was good in all her other paces as well as the trot. After some years she was devoted to the stud, and bred five foals, the first by a good half-bred horse and the others by different thorough-bred horses. Her first foal showed much more substance than any of the others, made a good price, and is a valuable animal at the present day. Not one of the others repaid expenses; one proved a clever animal for a light weight, but none possessed sufficient substance to be anything like as valuable as the mare.

4. Another of my acquaintance some years since had a small but very neat mare almost thorough-bred. He put her to a large Yorkshire trotting stallion, and sold the produce at three years old for sixty pounds; when afterwards he put her to thorough bred stallions the stock were all deficient in substance, and consequently unprofitable.

5. A farming friend had a capital fast mare, somewhat small, and rather more than half-bred; he put her to the last named stallion, about one-fourth-bred: the produce, a mare now in my possession, is very clever and somewhat larger than her dam. Though too hot for the hounds, she is a capital hack as well as an invaluable harness-mare. I consider this to be a successful example of breeding from two parents, both well, but neither thorough-

bred. The dam of my mare was next put to a thorough-bred horse, and produced a foal which had not nearly the value of the first, gave out in the fore-legs, and was last seen in a London cab. The sire referred to invariably got good animals when put to well-bred mares, and useful ones when coarser mares were employed.*

6. Another of my acquaintance some years since gave 50*l.* for a mare apparently threeparts-bred, which now in her old age is such a model of symmetry that she attracted my special attention when recently exhibited at a local show. She proved to be a good hunter for an average weight, but before she could establish her character, became lame, was devoted to the stud, and has bred many colts. One of these, by a thorough-bred horse, became a very clever and valuable hunter for a moderate weight; the other colts were mostly by a light and rather leggy but very active Suffolk cart-horse, with good flat fore-legs and good feet. The oldest of these, which promised to be a capital jumper and a good weight-carrying hunter, was bought by a farmer (a heavy weight in the hunting-field) for 50*l.*, and after exhibiting his qualifications in a good run, was resold for 100*l.* on the same day. The new owner, hearing afterwards that he was got by a cart-horse, felt somewhat disgusted and parted with the horse for 80*l.* to a dealer, who very soon disposed of him for double this sum. The other two colts by the same horse are very promising. Although such a strong cross as this is not to be recommended, it is worthy of note as an example of the powers of the mare to transmit her qualities of speed and endurance to her offspring, so as to render them good hunters.

7. A late master of hounds in a neighboring county rode for some years a threeparts-bred stallion, that besides being a first-rate hunter was also used somewhat extensively as a stud-horse. His stock was almost universally good and remunerative to the breeders.

8. To these examples may be added some strong cases, kindly

*This horse was the son of "Performer," and the grandson of "Old Pretender," by "Fireaway" (celebrated trotting stallions of their day), out of a threeparts-bred mare, having the strains of "Forester" and "Hambletonian." "Old Pretender" trotted 15 miles within the hour, with 15 stone on his back, whilst "Fireaway" did 2 miles in 5 minutes. It is matter of very great regret that this breed of horses has not been kept up in all its integrity, and that trotting-matches have been allowed to sink into disreputable and low hands. Probably the cruelty that was often connected with these time-matches, in which the same horse was backed to go, say, from London to York, or to Exeter, in some short time, led to their being discountenanced by the more respectable lovers of the horse.

communicated to me by Mr. H. Overman, of Weasenham, Norfolk :—

“H. K. S——, Esq., of W——, Norfolk, had two horses of extraordinary good qualities as weight-carrying hunters; they had great pace and endurance, and were good performers. He rode them in Norfolk, Northamptonshire and Leicestershire, and refused 700 guineas for the two. Their dam was a thorough-bred mare that ran well in the Oaks, and their sire was a half-bred cart-horse and hackney, with fine shoulders, good action, strong loin, deep girth, and good thighs and legs.”

9. Mr. Overman adds: “I used the same horse to two mares of my own, one a well bred Irish mare. She threw a filly, which I sold for 100 guineas, and has since made nearly 200. The other mare was threequarter-bred, and she threw a colt which turned out one of the best performers I ever saw. I sold him to H. B——, Esq., of Norwich, for his brother in Surrey for 130 guineas, and 400 guineas have since been refused for him.

10. “One of the best horses now in Lord H——’s hunting-stables was by a Norfolk hackney out of a half-bred hunting dam. We find in Norfolk if we put our Norfolk hackney to a well-bred mare with size, she is sure to throw a good animal. ‘Tom Moody,’ the property of Mr. J——, of Hopton, was not thorough-bred, neither was Mr. Goold’s ‘Shackaback;’ and these two horses are the sires of scores of good and valuable horses in this county.”

He adds: “The late Mr. Theobald, of Stockwell, in Surry, always said that it was much better to put the hackney horse to the blood mare than to adopt the reverse plan; the former course being almost sure to bring a good animal. A blood mare, the property of an uncle of mine, bred seven foals by hackney and cross-bred horses, and all proved animals worth a good deal of money.”

My purpose in adducing these examples is to show that useful horses almost always, and valuable ones very frequently, can be bred as hack, hunters, and carriages horses, by using the half or threeparts-bred stallion with well-bred mares, so as to secure a sufficient amount of substance to carry weight. Not that we can thus breed horses of greater value than by using the thorough-bred stallion with suitable mares, for we can scarcely have too much breed, provided we have sufficient substance; but by following the system recommended, if we do not succeed in getting higher prices, we shall at any rate have fewer failures.

We have seen that with regard to sheep at least three different and valuable breeds have been inaugurated by cross-breeding, careful selection, and constant weeding; and the prevailing opinion is, that these possess certain desirable qualifications which render them more profitable than their parent races. Still there are those who deny this, and contend that there are pure breeds of sheep that can supply every requisite. Be that as it may, the case is much stronger with regard to the horse; for there is no one who would contend that the qualifications of a first-class weight-carrying hunter can be met with in any one pure or original breed, or that it can be otherwise secured than by the well-assorted alliance of blood and bone. Surely, then, if with sheep we can succeed in the course of twenty years in establishing a distinct breed, we can with equal or greater ease establish a breed of horses that will support with ease a six-foot guardsman with his heavy accoutrements, and dash into the charge with all the speed and spirit induced by the influence of a full equivalent of blood derived from both parents. The French are already trying this system; and if we are remiss, will in a few years surpass our cavalry in its most essential characteristic. There can be no reason why the defects which crop out after the first cross should not be as readily extinguished in the horse as in the sheep.

It is as well to notice, that valuable as is the Norfolk trotting stallion, when put to well-bred mares for breeding hacks, he is as a rule too deficient in size to get dragoon-horses, or those weight-carrying hunters which have been the glory of our land.

One argument adduced by the advocates of the universal employment of the full-blood sire is somewhat plausible, and has not perhaps been sufficiently disposed of. They say, it is desirable to have a pure-blood on one side at least, so that defects appertaining to the progenitors, but not apparent in the parents, may not, as in mixed pedigree, reappear in the offspring. This argument is good to a certain extent, but it applies equally to each parent, and if it can be dispensed with in the case of the mare in order to secure size and bone, it may also be given up for equal advantages in that of the sire, who would not have been devoted to the stud unless in addition to his pure lineage on one side, he had derived from the other some rare hunting qualifications and sterling merits which it would be most desirable to perpetuate.

CONCLUSIONS.

We have endeavored in our preceding remarks to establish the correctness of the following points :

(a) That the use of the thorough-bred horse or mare has greatly improved the coarser bred in speed and bottom. That the blood has amalgamated exceedingly well with other breeds, and that the good results of even one cross only has been seen in various degrees and for several generations.

(b) That the effect of crossing with the thorough-bred is to increase the supremacy of the nervous and the muscular systems, and is more particularly shown in the fuller development of the thighs, the hind-quarters, and the elongation of the muscles generally. But that with these advantages the bones, joints, ligaments, and sinews are smaller and less powerful, and the action, although quickened, is rendered lower and less safe. The ability for jumping and for carrying heavy weights without injury to the joints and sinews, is greatly diminished. The skin is also rendered thinner and more liable to abrasion, the carcass smaller, and there is a diminished capability for putting on flesh.

(c) That so long as suitable mares with sufficient substance can be procured, the breeder of hunters should, on the rare occasions when they are offered, avail himself of the services of a first-class thorough-bred stallion, or even one of the second class, provided he has hunting qualifications,—good substance, or good high action in the trot or walk.

(d) If, going a step further in the same direction, the breeder seeks to put the female progeny to the blood-horse, he will most frequently fail; the offspring becoming too light; whilst if he had availed himself of the half-bred or three-parts-bred stallion (the grandson of a great racehorse,) his stock having the same amount of breeding as the dam, would have afforded him a fair chance of realizing a high price, and failing this, a comparative certainty of a fair sale for the cavalry, or for the general market.

(e) Having duly recognized the claims of thorough-bred horses of the first and second class, we can only advise, with regard to the third and inferior classes, that their services be altogether dispensed with, their place being taken by three-fourths, or half-bred stallions, possessing bone, substance, and good hunting qualifications. And it is such animals as these that deserve encouragement from our great Agricultural Societies.

For the encouragement of horses of this stamp we should be

glad to see prizes offered for the best seven-eighths, three-fourths, and half-bred stallions, so that the owners of promising horses might be induced to delay the operation of castration until the animals had undergone the ordeal of the show-yard, and the prize-winners might be launched into the world with the Society's approval. Some of the prizes for ponies might well be dispensed with to provide money, if it be wanting, for this more important purpose. At any rate, it may be hoped that the Council of the Royal Agricultural Society will remove the impediments which shut out such a horse as "British Statesman," the first-prize winner at Battersea, and the second at Leeds, from competing at Newcastle among the stallions for breeding-hunters. The flaw in his pedigree, one-eighth, gave him, no doubt, more bone, sinew, and substance generally, and rendered him fit to carry an extra stone in weight, qualifications which doubtless gained him the prize of 20*l.*, offered by the gentlemen hunting the North Staffordshire hounds, for the best stallion for hunting horses.

This suggestion is not meant to imply that prizes for thorough-bred stallions should be dispensed with: on the contrary, if the state of the Society's funds permit, separate prizes should be offered for thorough-bred sires, adapted—

1. For getting Hunters ;
2. For Carriage Horses ;
3. For Park Horses, Chargers, or Hacks.

Prizes in each of these classes would then be assigned to animals differing much in character, but no longer, as at present, to the best race horse, or according to the rather puzzling and peculiar condition of the prize-sheet, "to the horse best calculated to perpetuate the breed of the sound and stout thorough-bred horse for general stud-purposes." Such a horse must unquestionably be neither more nor less than the sire of the greatest race-horses of the day.

But if this is too wide range for an Agricultural Society, the Managers of the Islington horse show may take this hint into consideration.

Those of our readers who were present at the splendid exhibition of thorough-bred stallions in the Agricultural Hall last summer, must have been struck with the great variety that obtains in the shape and action of the thorough-breds then exhibited, and might, without any assistance from the judges, point out the particular horses with suitable characteristics for each of the several purposes

above mentioned. "Caractacus" and "Nuthorne" may be taken as correct examples of the true *race-horse*. The sprightly "Neville," with his splendid knee-action, may be regarded as the proper sire of the charger and the park-hack, whilst the powerful "Warlike," with his compact frame, is the very type of a weight-carrying hunter, so far as a blood-horse can be one. "Newcastle," the favorite of the judges, might put in a claim either as a hunting-sire for a moderate weight, or, with his fine action and good legs, as the sire of a charger or park-hack; and he probably gained his honors because he was thought to combine best in his own person the several and diverse qualifications required by the conditions of the prize-sheet. There were also some showy animals, with long arching necks and grand action, that might properly be considered as suitable sires for high-bred carriage-horses.

THE HORSE.

HIS NATURE AND TREATMENT.

(*Found among the papers of the late M. A. Cuming, V. S.*)

[The following paper appears to have been prepared for delivery in New Brunswick as a Lecture. It bears evidence of that intimate acquaintance with his profession, and the strong practical common sense so apparent in his other written productions. The slight variations which he might have made to adapt it to the latitude of Maine, will readily suggest themselves to the reader, while the valuable practical hints with which it abounds may be as useful here as in the adjoining Province. Those who remember the valuable contributions of Dr. Cuming to our reports for 1857 and 1859, will need no prompting to give this a hearty greeting.]

In directing attention specially to any subject or object, it is always well, I think, to have clearly in our mind's eye the precise place in the world of *thought* or *being* which that subject or object occupies; as by so doing, we can not only confine our attention the more strictly to the matter itself under consideration, but we can also the more easily apprehend the connections and relations which exist between it and others of like kind with which it may chance to be associated or have to be compared.

The subject of the remarks I bring before you is "The Horse, his Nature and Treatment," with special reference to things as they exist in this country. The subject is a wide one,—would be more easy to make into six or a dozen lectures, than into one, and consequently you can only expect an outline of what might be said upon it; an indication as it were, of the ideas it suggests, rather than a full discussion of the points it involves.

In order to make the most of the limited time at my disposal when I began to put together these remarks, I proposed to myself the following arrangement:

- 1st. The natural history of the horse and his natural condition.
- 2d. The rationale of domestication and the changes it produces.
- 3d. The treatment of the animal, or what we should do for him.
- 4th. The working of him, or what we expect him to do for us.

I have made a diagram showing the place in the animal kingdom

which the horse occupies ; and should this introduction of a thread of general natural history tend in any degree to promote the study of this interesting department of science, I trust you will excuse me for bringing it in.

Naturalists for the purpose of classification and identification, have divided the whole animated world,—all that live, move and feel,—into four well-marked divisions or sub-kingdoms, beginning with the lowest in the scale of organization, viz :

1st. The Radiata, of which the star-fish and a great many similarly constituted animals are examples.

2d. The Mollusca, of which the shrimp and common snail are familiar examples.

3d. The Articulata, embracing insects, crustaceous shell-fish and many others.

4th. The Vertebrata, or all those animals having an internal bony skeleton, its parts connected together by a back bone, spine, or vertebral column.

The Vertebrated sub-kingdom naturally divides itself also into four well-defined classes, still ascending in the scale of organization and intelligence, viz : the fishes ; the Reptilia or serpent tribes ; the Aves or birds ; and lastly the Mammalia, or those animals that bring forth their young alive and nourish them with milk secreted by Mammæ or teats. To this last named class belongs the horse.

The Mammalia are again divided into two well-marked sub-classes, each consisting of several orders. These sub-classes are, the *Unguiculated* or clawed, those animals having the extremities divided into toes or claws, as in the cat, dog, mouse, lion and many others, and the *Ungulated* or hoofed animals, among which again is the horse.

Of hoofed animals there are two recognized orders, viz : the *Ruminantia*, or those that in the language of the Old Testament “part the hoof and chew the cud,” and of which the cow, sheep and deer are well-known examples ; and the *Pachydermata*, or those hoofed animals that do not ruminate. The Pachydermatose order as you will see marked on the diagram, consists of three groups : the *Proboscida*, to which belongs the elephant and some other animals now extinct ; the *Suidæ* or pig tribe, of which also there are some extinct species ; and the *Solidungula* or solipeds, those animals having the hoof or foot in one solid piece or toe. According to our present knowledge, the solipeds consist of but one genus or

PLACE OF THE HORSE IN THE ANIMAL KINGDOM.

<i>Sub-Kingdoms.</i>			
Radiata,	<i>Classes.</i> <div> <div>Fishes,</div> <div>Reptiles,</div> <div>Birds,</div> <div>Mammals,</div> </div> <div> <div>Sub-Classes.</div> <div> <div>Unguiculata,</div> <div>(i. e. clawed)</div> </div> <div> <div>Ungulata,</div> <div>(i. e. hoofed)</div> </div> </div> <div> <div>Orders.</div> <div> <div>Ruminantia,</div> <div>Pachydermata,</div> </div> </div> <div> <div>Groups.</div> <div> <div>Proboscidea,</div> <div>Suidæ,</div> <div>Solidungula,</div> </div> </div> <div> <div>Genus.</div> <div>Equidæ,</div> </div> <div> <div>Species.</div> <div>Caballus.</div> </div>		
Mollusca,			
Articulata,			
Vertebrata,			

family, the *Equidæ*, to which belongs the horse, ass, zebra and some others, and of this family the horse forms the species *Caballus*. Thus you see among animals the horse belongs to the *Vertebrated*, or *boned division*; to the *Mammiferous*, or milk-giving class; to one of the two *Ungulated* or *hoofed orders*; to the *solid-footed group*; and in the language of the naturalist is known as *Equus caballus*. You will see also from this classification that setting aside his individual qualities, the horse is nearly related in organization to almost all those animals that are most useful to man as giving him their services in the shape of labor, of food, or of clothing. Thus man has as his servants the camel and dromedary, hoofed animals, specially fitted by nature for the African deserts, and the elephant equally so for the jungles of the East. Then the horse, the ass and mule for service in more temperate regions, while even the Laplander in his land of snow, has his faithful and useful servant the reindeer. And then for clothing and for food, we have the sheep, the ox, the pig and the goat, all animals of the *Ungulated* or *hoofed* kind, and if we were to compare more minutely the *structural peculiarities* of these animals, we would find about them evidences of design and creative contrivance admirably adapting them for the ends they were intended by nature to serve. It is to one of them only, however, that we must confine our attention.

The natural condition of the horse is that of entire freedom; freedom to choose his food, his drink, his lodgings, and his associates. The anatomy and physiology of the covering of his body show him to be a native of a warm or at least a temperate climate. The furnishings of his mane and tail are defences given him by nature against the numerous insects with which such climates abound. The structure of his teeth, and digestive system, show his food to be both herbs and seeds. The smallness of his stomach, and the rapidity with which food passes through it, indicates him a continuous eater, and left to himself he feeds twenty hours out of the twenty-four. His organs of circulation and respiration mark him as capable of severe and sustained exertion; but at the same time as requiring a constant supply of pure, free air. The development of his organs of smell shows this faculty to be peculiarly acute, and the formation of his eye tells us that he is a nocturnal feeder and traveler, and can distinguish objects placed before and below him nearly as well by night as by day. The nervous sensibility of the bristles about his muzzle and eyebrows tell his acuteness at detect-

ing "a snake in the grass," if such should be; and his acute and ever open ear, capable of direction to every point of the compass, mark his aptitude at observing danger. The hardness of his hoofs and the power of his jaws show the means of offence and defence which he possesses; while the suppleness and fleetness of his limbs afford him in emergency the speedy means of retreat. He is highly social, and gregarious in his habits, fond of company, a protector of his friends and a terror to his enemies.

Such are a few of the means by which nature has adapted the horse for taking care of himself and for making his condition comfortable; we will find a benefit in keeping them in view when we come to consider the domestic condition of the animal.

There is nothing which theoretical writers and imaginative artists have troubled themselves so much about in regard to the horse as to make out the picture of a perfect animal, and there is nothing on which, one with another, they have so much differed. Some would have one, some another part of his body to be large and well-developed for the sake of strength; others would have the same to be small and fine for the sake of beauty. One would have certain of his bones to be long to give him speed; another would have the same to be short to make his motions easy. One would have him to excel in this respect, and another in that, and coming to particulars there is no end to the variety of forms and proportions that have been put forward, all as parts of the *perfect horse*. The reason of all this diversity is, that the thing sought for does not exist. In domestication there is no such thing as a perfect horse, any more than there is a perfect man. Take him as he roams wild in the desert and we find him in every respect *perfect, suited and designed* for the kind of life he leads; but bring him into the service of man and immediately the case is changed. The animal is the same in all his parts, but the purpose is changed to which these parts are applied, and that which before was perfection may now be either a superfluity or a defect.

The *rationale* of domestication is this: we take the animal from the state in which nature has planted him, and we inflict upon him certain artificial conditions at variance with his natural habits; in doing this we subject him to undoubted injury. But then in compensation we provide him advantages which in nature he could not obtain, and the good or ill of domestication, so far as the animal himself is concerned, lies in the balance between the injury thus inflicted and the equivalent compensation. For instance, we deprive him of

his freedom to roam where he lists, but we can if we will compensate for this by providing him a safe and comfortable lodging and shelter. We deprive him of the power to select his food, and take it when and how he will, but we can compensate by providing it of better quality and with less labor in the gathering than he could otherwise have. And so on with other things that I need not name. And then again with his work we put him to tasks which in the state of nature he never has to perform; we can only compensate for this by cultivating and developing from generation to generation those parts of his mechanical structure which being in excess of strength renders it the easier for him to perform the labors we assign. Thus if we wish him to draw we cultivate the points upon which the power of drawing well depends, till we produce a *breed* suitable for hauling only. Then if we wish him for the saddle we select and cultivate other points essential to speedy progression and the bearing of weight, and we produce the *road horse* or the *hunter*, and if we want him to race with we must develop parts different from either, for it must be borne in mind that it is not a matter of accident, nor from fancy, that we select one form of horse for one kind of work and another for another; but that there are certain definite mechanical arrangements in the structure of the animal, the deviations from which in one way may increase his usefulness in one respect while in another way it may do the reverse. And that in regard to certain of his powers and these not the least important, the horse is as much a machine and as much depends upon the mechanical adjustment of his parts as does the watch or the steam engine; and that if we put him to purposes for which he is by conformation unfitted, we are as sure to be disappointed in the result as if we set a locomotive to do the work of a time-piece, or expected the town's clock to drive a sawmill. When, therefore, a horse gets into any unusual condition, or when anything out of the common course requires to be done for him, we are apt to ask "is the thing natural?" And in so judging we think we have a guide as to whether it be advisable, and so far well. But in reasoning thus it is necessary always to keep in view that the nature of the animal is modified and changed by his domestication, in neglect of which we are prone to go into error rather than out of it. For instance, it is not natural for the horse to eat cooked food, to wear shoes nailed to his feet, nor to pass his time inside a close house. But in domesticating him we find these variations from nature necessary, and to compensate we must see that his food be

properly cooked ; that it be neither hot nor stale. That his shoes be *suitably filled* to his feet, his size, and his work, and that the cleanliness and ventilation of his lodgings be attended to. And so on with every possible variation that may occur, always keeping in mind that the *rationale* of profitable domestication is not adherence to nature, but compensation for our deviations from it.

On the treatment of the horse, I would notice the following points, viz : his feeding, his lodging, his shoeing, and his harnessing.

The natural food of the horse I have already mentioned is herbs, grasses and seeds. In his free state I am not aware that he ever feeds on roots. It may be that the roots of wild plants are distasteful to him. It is more likely that few of them ever come within his reach. Be this as it may, it is one of the modifications of his constitution which domestication has produced, that certain roots are not only agreeable to his palate so as to be highly relished, but they are also exceedingly nutritive to his system. We take him from those temperate regions of the earth where vegetation every day furnishes him with something fresh and succulent, and we tie him up eight months of the year on dry and often ill-preserved provision. It is the least we can do in compensation to give him every day a portion of food as near as may be in composition and condition, to those vegetable juices for the digestion of which his stomach was made. Whenever therefore we put a horse on dry hay and grain we should always give him, once a day at least, a portion of root-feed ; and without entering into the chemical composition of the different root crops of this country, which present time does not permit, and without disparagement to others, I think the preference is to be given to the carrot and Swedish turnip, and in ordinary cases they may be fed raw, with full as much benefit as cooked ; a statement which does not apply to the potato when similarly used. Horses fed for a special purpose, as preparing for a race, for instance, may be kept for some time almost on grain alone, but as a general rule no horse can long sustain health without a considerable proportion of fibrous food, hay or stalks of some kind. In this country hay seems the favorite, but taking it in its general quality as we see it brought to the St. John market, I question much if it deserves the preference, even for its feeding qualities, while as an article of agricultural produce it is decidedly inferior to others that might be raised.

Of grains, oats have been preferred wherever the Saxon tongue

is spoken, ever since Dr. Johnson characterized them as "food for *Scotchmen* and *English horses*"—how long before it is hard to say, nor I think is the preference unmerited; no other grain of ordinary growth, given alone, will sustain the horse so long in health and enable him to do the same amount of work as oats will. Barley or linseed will fat him faster, and peas or beans will enable him for a time, to sustain a greater amount of muscular exertion, but either of these grains if alone used, will soon tell to disadvantage on the digestion and constitution of the animal; mixed in limited proportion with oats they may be used with great advantage. Speaking of oats, allow me to notice an idea commonly prevalent, that any quality of the grain is equally good to feed a horse with, if he just get a little more weight; but such is far from being the case. If you take a light oat, and a heavy, and steep or boil them, the heavy, well filled one swells, softens and bursts in the process; the light, lanky grain remains as it was. The same occurs in the stomach; the good grain is digested, the inferior is rejected and fails to give up even the small amount of nutriment it has. When a provincial exhibition has to be got up, New Brunswick produces her oats forty-eight and fifty pounds a bushel, but when her horses are only to be fed, thirty to thirty-five is more the mark. Now to say the least of it this is sad waste of capability. When the soil and climate of the Province can produce the superlative samples of oats that were shown at Frederickton in October last, why should it ever do less? Or why should your horses have but harsh and shriveled husks to feed upon, when a better system would afford them plump and nutritious grain? Perhaps by these remarks I may be doing injustice to this part of the country. But I can assure you that in St. John, in the best stables public and private, I see oats in daily use that the poorest hill farmer in Scotland would think a shame to see on his barn floor, and which if a Scotch ploughman were told to take and feed his horses with, he would turn up his nose, and tell his master that he could not expect above half work to be done. While speaking of grain, there are two other kinds grown in the Province that I may be expected to notice, namely, the Indian corn and the buckwheat. Of the first, I hear various reports, some recommending it, and some the reverse. Its chemical composition would indicate that it was, like barley and linseed, better adapted for fattening than for working on, but in my own experience I have not seen enough of its use to be able to pronounce an opinion. Of the buckwheat I can speak even less; all I know being that it belongs to a family of plants (the *Polygonum*)

which in their wild state, and the horse left to himself, he avoids to touch, a fact which does not speak in its favor.

One remark more must dismiss for the present the qualities of the horse's food. Recent chemical and physiological researches have shown in all feeding substances, two notably different elements serving widely different purposes in the economy of the animal fed. The purposes served are the supply of muscular waste, as produced by labor, and the keeping up of the animal heat. To promote the first, those substances are most useful that contain the largest amount of glutinous or albuminous matter, such as peas and beans; for the second, sugary, starchy and oily food, such as barley, linseed and corn, are best adapted. And the reason why oats are so *generally* useful, may be, that they hold a place intermediate in chemical composition between the one and the other, but the practical hint to be derived from science as regards this country, is that the grain food of the horse *should differ with the season of the year*. In the heat of summer, when fat is a burden, the muscle forming elements in the food should prevail; while in winter, with an atmosphere eighty or a hundred degrees below the temperature of the blood, and every hair standing at its own particular angle, we require to feed, not only to fit the horse for his work, but also to keep him warm; then the oily, saccharine and starchy grains should be more largely allowed.

In addition to the food of the horse being suitable in quality, something at times depends on the condition it is given in, and *much upon the timing of it*. His masticating apparatus is a peculiarly efficient one, and when he has little to do, and his food is of good quality, no preparation of it is needed. But if he be overwrought, if his grain be light and of inferior quality, or if old age has begun to impair his grinding organs, then the case is different, and anything that we can do to lessen the expenditure of muscular and nervous energy in the digestion of his food, is a positive advantage, a compensation in some measure for the labor that we exact. With barley, beans and peas, boiling is the best preparation. With oats or linseed it is different. Boiling does not render either of these digestible unless the seed be plump enough to burst the husk, but it often leads the animal to swallow with a less amount of mastication, and as a consequence, if the grain be light evil is done instead of good. With oats, such as I see in common use in this country, I would say do not boil, but if you wish your horses to thrive, bruise, grind or crush them.

As to the feeding of the horse with regard to time, I have already noticed the smallness of his stomach and the continuance with which he eats. Two or three things are to be learned from this. One is that he is particularly ill-adapted for long fasting. Another that he should have his feed put before him at intervals of time, and in moderate quantities. And a third that he should never be suffered to gorge himself with food on an empty stomach, after a long fast. These points I can only stop to indicate; to go into the rationale of them, and of the evils arising from a neglect of them, would require a chapter to themselves. But I must pass on to the next point of our treatment, the lodging of the horse.

The structure of his skin and hair I have already noticed, show him to be the native of a warm or at least a temperate climate, and bespeak for him a dry, moderately warm, and equably temperatured habitation. The large expansion, delicate structure, and important functions of his lungs, tell the necessity of pure free air and adequate ventilation. His love of freedom, social disposition, and more than either, the structure of his feet and pasterns plead for the loose box in preference to the stall; and his eye, better suited to a subdued than a glaring light, indicates the color of the walls of his dwelling and the manner in which it should be lighted.

If we bring the ordinary plan of stable structure in this country to the test of these rules, we will find a good many things to modify and amend. At first, after arriving in the Province, I was a good deal troubled at people always calling the stable *the barn*. On better acquaintance, however, I began to find that "*barn*" was, after all, the more appropriate name, as the erections in question had few or any of the requisites of stables about them. To prevent the products of respiration, transpiration, and the fumes from the floor from escaping in the natural way, that is, upward, there is usually close over head a well packed mow of hay, straw or litter; and lest he should become too warm about the legs and body, a free current of cold air is circulated below the floor and through a hundred crevices in the lower part of the walls; making ventilation where it should not be, and preventing it where it should. And then the stalls, short, dark, and sloping backwards: no wonder that we find the horse often hanging back in his halter and seeking to get into a better position and light. The trouble is, how is this ruinous system of housing to be remedied? for ruinous it is both to the health and usefulness of the animal; not easily, so long as the present style of structures are retained, but

with little trouble when new ones have to be built. All I can reach at present, however, is to indicate general principles, leaving details to be otherwise filled up; and first as to the temperature. The climate is by all allowed to be prone to extremes, heat in summer and cold in winter, and one use of our stables is to equalize this. If we wish to preserve vegetables from fading, or water from becoming hot and vapid in summer, we put them into an underground cellar; if we wish to preserve the same things from freezing in winter, we do the same. And we do so, and are justified in our doing it, on the principle that the range and variation of the temperature of the earth is very much less than that of the air. Now I am not going to advise you to put your horses into cellars, far from it, but I am going to say that instead of raising the floor of the stable *one, two, three, and sometimes six* feet above the ground, as we commonly see them, if they were as far sunk into it, *care being had by sufficient drainage to make the bottom dry*, it would be very much to the advantage of the animal for health, comfort, and usefulness. The farther the floor was sunk, dryness being provided for, the warmer and more uniform would the temperature be, and the less would the limbs and body of the animal be exposed to those draughts and cross-currents which are the cause of half his ails. But some will say, if you close the house up at the bottom this way how are you to get it ventilated? Simply, I reply, by having it more open above. There is a very erroneous notion about ventilation,—prevalent even with many who should know better—that it cannot be properly effected without through draughts. But such is not the case. The laws which nature has established for the dispersion and diffusion of gases, if left free play, require no such adventitious aid. Nature has given to every kind of gas and vapor a tendency to distribute and equalize itself through every other with which it may be in contact. This can be best shown by the following simple experiment. You are aware that some gases are light and others heavy, some colored and others transparent. Take two pieces of thin glass tube such as this, but close at one end, fill the one with hydrogen, a colorless gas and the lightest of all known substances; fill the other with chlorine, a green colored gas distinguishable to the eye and thirty-five times as heavy as the other. Then connect the two tubes together so as to exclude all external air, but leave free communication between themselves; turn the tube with the light gas uppermost and mark the result. Were it two liquids so placed the heavy one

would remain at the bottom and the light one above, for any length of time; not so with two gases; in a very short time one-half the heavy gas has ascended into the upper tube, displacing a portion of the light one, which has descended to the lower; in fact the two have become equally mixed and diffused. Now this law of diffusion holds equally good in the extended sphere of the stable, as in the limited one of the glass tube; and to have the benefit of pure air there without its disadvantages our through draughts should be made above the horse's head, instead of below his heels. Give plenty of height and establish a supply of pure air above the animal, and let the matters below look to themselves, nor fear for their escape. This would do away with the convenience of the spare room above the horse for the stowage of his winter provender, and the sooner the better, for although the hay-mow forbids the free *diffusion* of the foul vapors continually rising to it from below it is peculiarly apt at their absorption, and the poor animal has the fetid emanations from his lungs, his skin, and even worse, dried and daily laid before him in his food, forming, I see great reason to believe, one of the causes why broken wind is so notoriously prevalent in this country beyond what it is in places where a better system of stabling exists.

I have only time, in regard to the shoeing of the horse, as a part of our treatment of him to notice one or two of the leading principles as they bear upon errors in the plan of shoeing that I see common in the country. One of the most obvious errors to be noticed is the cultivation of *long toes*. Here is an example of a fore foot picked up the other day, not by any means the worst that could be found, but carried sufficiently far to illustrate the plan pursued, and show the form of foot that the blacksmith makes. Here are the bones of the foot as nature makes them; compare the two. The one has its greatest dimension longitudinally, the other transverse; the one projects forward and downward, the other is turned up and notched back; now which of these forms is likely to be best, nature's or the blacksmith's? When the foot is unshod and the horse at liberty, the growth of the hoof is barely sufficient to provide for the constant wear and tear of the sole and toe, and consequently no part is superabundant. But the shoe prevents this tear and wear without materially checking the growth of the hoof, and in compensation, every time the shoe is off, the foot should be brought as near as possible to the shape that nature gives. The sole should be thinned, the lower edge of the crust

cut down, the toe shortened, and rather turned up than pointed downwards; and the frog and bars, parts that are exposed to the wear of the road, left entire. The reverse of this, however, is commonly done; the *frog*, *bars* and *heels*, the whole back part of the foot is cut away, and the toe is left long. Look for a moment at the effects of this upon the horse. The function of the fore leg is mainly that of supporting the weight of the body, neck and head, and of transferring that weight forward from point to point, the time the animal is in motion. In performance of this, its mechanical action is near akin to that of a spoke in a carriage wheel, it is in fact a lever, but one of the third class, in which to give increased speed the power acts at a disadvantage, the fulcrum or fixed point being at the long end of the lever; this long part is the leg from the elbow to the ground, the toe being the fixed point over which the body is raised, and any addition made to the length of the toe is just the same as placing a block before the wheel of a carriage; it acts against the muscular power of the horse as used in the carrying forward of his body. Nor is this the only evil, every addition made to the length of the toe, (especially if the horse be made to stand as he commonly is most of his time in a stall with the floor sloping backwards,) every such addition throws an additional strain upon the tendons and ligaments that support the back part of the leg; and the horse to relieve himself stands either with the foot pointed or the knee flexed, both positions known to horse fanciers as signs of something going wrong. It would be well when such symptoms show themselves, and save the usefulness of many a good horse, if the true cause were understood and the evil remedied.

Another of the evils arising from the long toe is all I can at present notice. It very often leads to brushing and interfering. The horse finding the long projection in front as so much leverage acting to his disadvantage, gradually gets into a habit of raising himself from one or the other of the quarters. If he rise from the inside he throws the thick part of his pastern into the way of being struck by the upper part of the hoof of the other foot. If he rise from the outside, he throws round the edge of the shoe and runs the risk of cutting with it the opposite leg. So much for the long toe; if it were made of as pliable material as we find our boots to be in this wet weather, the first few steps would knock it out of the way, but to prevent this we hoop it with iron and make the infliction sure.

Another evil in shoeing that I have had to complain of almost daily since I came to St. John, is the want of a clip or projection turned up in front, to form an abutment against the point of the toe. I have already noticed the way in which the fore leg transfers the weight of the body forward from point to point. In doing this a considerable degree of concussion is inflicted upon the foot every time it strikes the ground. The direction of this concussion is neither forward nor downward, but between the two. It partakes of the horizontal motion of the body of the animal along the road, and of the perpendicular direction of the descent of his weight. The hoof of the horse is composed of an infinite number of dense fibres strongly agglutinated together; and to meet and support the concussion these fibres are every one of them so placed as to receive the shock directly on their ends. In addition to this, the front part of the hoof, where the force of the concussion is greatest, is twice or thrice as thick and strong as the sides and heels. Now the design of all this extra strengthening is very obvious; and by turning up a clip on the shoe as an abutment for the toe to press against when the foot comes to the ground we make both shoe and foot to act together in harmony. We save the shoe from being knocked off and at the same time we promote the natural action of the foot. In shoeing without this simple improvement the nails have not only to support the weight of the shoe, but they have also to bear the force of the foot striking the ground; and the shoe being found from these two causes more inclined to come off than is wished, recourse is had to nailing, not only at the toe, where from the thickness of the hoof it is harmless, but round the quarters and even to the heels. Here is a shoe made in the capital of the Province, that well exemplifies the system. I do not know if it be one of those that took the premium at the exhibition, but I know it is one of a set, all of the same form, that came down to St. John a few weeks ago, the unfortunate wearer being lame on all four feet at once, and showing more forcibly than I can describe, the evils of fettering with iron bands the foot in its most elastic and expansive parts. Time does not allow me to enter into the subject of shoeing farther, but there are two or three rules which it may be worth keeping in mind. At every shoeing have the toe shortened and the crust and sole taken down to the condition of the unshod colt. Give an even bearing to the shoe upon the hoof all round, and the toe a solid abutment against the shoe, and never allow a nail further back than the widest part of the hoof. Attention to these

rules, though it cannot remove, will in some measure compensate for the wholesale evils of nailing one of nature's finest structures to an insensible iron ring.*

On the harnessing of the horse I will only trouble you with one remark; it is in correction of an error that is frequently fallen into of placing the draught too low down upon the shoulders. I have already mentioned the use of the fore limbs to be the support of the weight of the body and the transference of it forward; that of the hind ones is the propulsion of the whole onward, and often in addition a heavy load to boot. We only need to glance at the skeleton to see the way in which this propulsion is effected. Tracing the outline of the bones from the hind feet to the onset of the neck they are a section of an arch, the upper and forward part of which in drawing, presses against the weight to be moved, that is if the point of draught be sufficiently high, but bring it down to the bottom of the shoulder, and you change the arch into a form much less capable of resisting pressure. This, however, is not the evil most to be complained of. The shoulder blade is the bone against some part of which the pressure of the collar must be made; and it is of importance that this pressure should be upon that part of the bone that has least separate motion of its own, in order to avoid the gnawing and wringing of soft parts, between the hard bone within, and the often equally hard collar without. The attachment of the shoulder blade and fore leg all together, to the body is by muscle or flesh only; there is no bony connection between them as in man and many other animals, and the attachment of the great bulk of these muscles is inside the bone about its mid-length. This, therefore is the part of the bone that has least independent motion of its own, and as if to mark it out unmistakably as the point of draught, nature has placed on it a strong and prominent bony ridge, against which the collar should abut. If it always did so, cases of shoulder bruise and shoulder lameness would be much rarer than they are. There is one remark, however, in connection with this to be made. The collar will never wear fair unless the line of the draught be about at right angles to the shoulder blade. In horses with very slanting shoulders, unless

* Those desirous to learn the writer's views on this subject more fully, are referred to the report for 1857, which contains a paper of nearly thirty pages from the same pen, and which is illustrated by engravings. There is reason to believe that it has already served to yield untold relief to the horses of Maine, and this connected with great pecuniary advantages to their owners. S. L. G.

the line of traction be proportionally depressed, if the point of draught be held high up, the collar is apt to jerk upwards and confine the breathing of the windpipe beneath. This, however, does not show that the principle of fitting the draught is wrong, but that we are using a wrong kind of horse for that purpose, and this brings me to the concluding portion of my observations, namely, the "working of the horse."

One of the chief purposes for which this useful servant of man is wanted is to draw. It may be to draw heavy loads upon the road, or to plough the land to a useful depth, or perhaps to haul timber in the woods—it is all the same, if it be draught that is wanted—there are certain forms and proportions of parts more suited to this than others. In the first place he must have weight, that as the body to be moved is heavy we may oppose weight to weight. But then the weight must be of the right kind. As the bones are the levers, by means of which all the motions of the body are effected, the bones should be short, strong, and heavy. And the muscles and tendons being the cords by which these levers are moved, should be strong and heavy also. As a rule therefore, the horse that is to be used for draught if suitably proportioned cannot have too much bone and muscle.

I can fancy an objection to this that a horse may lose in activity more than he gains in strength, but such is not the case. It has been proved by experiments, on all kinds of horses, with all sizes of loads, and on every kind of road, that the power of the horse to draw is greatest when walking about three miles an hour, and that for every addition of speed beyond this the load has to be lessened in a much greater ratio than the speed can be increased. That is if a horse be able to walk three miles an hour with a certain weight of load, and if we double this speed to *six* we require to take off *more*, considerably more, than half the load that he may do so; so that instead of the *running with nothing* way in which the draught horses in this country are commonly worked being a gain, it is a positive loss; both *immediately* of labor, and *permanently* in the destruction of horseflesh.

I plead not for the pampered pleasure horse, to whom it is a relief to be allowed to run away; nor for the more useful hack, the nature of whose work necessitates a given space within a limited time. To him the best compensation we can give is to shorten his stages. But for the horse whose regular daily labor is draught; I do maintain that he is entitled to that amount of time to do his

work in, for which nature has intended him, and that when we go beyond this, although it be to his hurt in the first place, it is to our ultimate loss.

In addition to wanting the horse for draught, we want him also to run in our stage wagons, to go to market, or to church with, or it may be to show off a little on a jaunt or a holiday. And now we must have an active, smart and good-looking horse. Then again, many people want a horse for the saddle, and as the plodding pace of the heavy horse and the nimble-namble of the light one are neither of them safe nor easy for the rider, we want a horse with strength to carry sufficient to make him safe to ride, and springiness of motion to make him easy to sit upon, and having these we care but little in this case whether he can draw or not. In addition to these uses some people want horses to run swiftly, the faster the better. Now it is very evident that these different purposes will require very different forms of animal to carry them out, and no man in his senses would think of putting the heavy draught horse in training for a racer, nor the fine limbed bit of blood to haul in the plough or the wood; yet the people of this country, those of them who have had the breeding of the horses at least, seem to have been striving after something equally unreasonable, because unattainable. That is, they have been trying to get one breed of horses to answer all these different purposes; and mark the result. They have got one, with few exceptions, not fit for any of them, a non-descript race, fitted neither to draw, to run, nor to carry.

When urging the evils of this state of things on different individuals since I came to this country, I have been repeatedly met by the answer that this is a young country yet and the kind of horses in it are the best suited to all its circumstances. We want a horse, say they, that can do a little of everything. Now I do not deny but a new country may to some extent require to tax its horses in this way, just as it does its men. The first settlers in a new country require not only to be their own hewers of wood and tillers of land, but they also often require to be their own tailors and shoemakers, their own carpenters and blacksmiths, and sometimes even their own doctors, lawyers and ministers. But then the question is, is it good for the progress of the country that this state of things should continue? Surely not. The division of labor is not only one of the main elements of civilization and social advancement in a country, but it is the very thing itself. No number of inhabitants, however many in a country, each doing a little

of everything for himself, without any regular division of employments, would ever make a country great or prosperous, and if this holds good in regard to the labor of man, it holds good in a much greater degree in regard to that of the horse, because the horse has less power of adapting himself to circumstances. While granting, therefore, that in the infancy of the Province a certain amount of *make-shift* in this respect might be allowable, I maintain that for the material advancement of the country the sooner it is got rid of the better. It is just as necessary for the profitable cultivation of the soil, for the cheap conveyance of produce from place to place, and for celerity of travelling, that there should be distinct breeds of horses for these purposes, as it is for the comfort of the person and the good government of society, that there should be different men to make the clothes, shoes and houses and to practice the professions of law, physic and divinity.

The cultivation of distinct breeds of horses for the different purposes for which this valuable servant is used, is therefore, I consider, our chief means of compensating him for the many laborious tasks we exact. In holding this opinion I am aware that I differ from a great many in this country, but I have stated it from an honest conviction, that *here*, as elsewhere, it will ultimately have to be adopted, and that the sooner it is acknowledged and acted upon by those who have the power, the better. If in any of the other remarks that I have made I have been too free with things as they are, I can only say that I have spoken of them as they strike a stranger. Familiarity will no doubt remove much of their seeming unsuitability, but if the things do not stand to reason in themselves, our being accustomed to them does not make them, in the least, less objectionable.

I have only been able, as I mentioned at the beginning, to indicate, to glance at, rather than to discuss, the various topics that the subject suggests. If I have failed to interest you, the fault is mine. The subject is one the more we would study it, the more it would open up to us, and the more we know, the more we would find we had to learn. In this respect the works of the Creator are unlike those of man. In the most perfect piece of human mechanism there is always something to desiderate, and the ultimatum of the design is soon seen through, but in material nature the farther we investigate, the greater are the evidences of design that we meet, and the more do we find to excite our curiosity, our admiration and our praise.

CATTLE DISEASE.

In previous reports, allusion has been frequently made to the lack of educated veterinary surgeons among us, and in fact, of any persons who are familiar with veterinary medicine and surgery, whether practitioners or not. Whenever our Agricultural College shall have been in efficient working condition for a sufficient length of time, it is hoped that this "plentiful lack" may be abated. The need of competent veterinary skill within reach, I have never felt more strongly than in connection with the circumstances about to be related.

It will be recollected that in March, 1862, a law was passed by the Legislature of this State in relation to contagious diseases in cattle. It was enacted with special, and I may also say, with almost sole reference to the Lung Murrain or Contagious Pleuro-pneumonia, then prevailing to some extent in Massachusetts, and which was imported from Europe; no other contagious disease of a serious character having threatened us at that time. Although several times reported to exist here, I have never had any proof of a single case of the *contagious* pleuro-pneumonia having occurred in Maine. There have been at times, for many years, cases occasionally occurring of inflammation of the lungs, and pleura, properly called pleuro-pneumonia, but never a case of the imported contagious disease which passes under that name, and there seems no probability that we ever shall have it, *unless it be brought in from abroad*;—the conditions here being such as to render it highly improbable that it will ever *originate* among us.

During more than a year past, a fatal contagious disease has prevailed in England, known as rinderpest, which originated in Russia and was imported into England from the continent. This disease proved fatal in many thousands of cases, and the percentage of recoveries where cattle were attacked, was very small. It seems for some months past to be greatly on the decline there, and hopes are entertained that they may be wholly rid of it before very long. The rinderpest differs very materially from pleuro-pneu-

monia, *being a disease of the mucous membranes, and chiefly affecting the abdominal viscera*, and not the lungs; although cases have occurred where both diseases affected the same animal, or at least, cases of rinderpest occurred where the lungs were found to be diseased, but it also appeared plainly that the subjects had been first attacked by pleuro-pneumonia. It is not known that rinderpest has ever appeared in America, but in one instance, a disease has occurred here which bore considerable resemblance to it in its symptoms and post-mortem appearances, as well as in being fatal, although no proof exists of its having been contagious.

I feel it to be a duty to call attention to the case, and to suggest a possible preventive in case it should again appear.

During the latter half of April, a disease appeared in the herd of Mr. Henry Freethy of York, York County. His herd consisted of ten. After several had died, a man, reputed a farrier, was called in from Berwick, who pronounced the disease to be pleuro-pneumonia, as he had seen it in Massachusetts some years ago. The selectmen then notified the governor and myself of the existence of a disease suspected to be contagious. I received the letter on the 11th of May, and the next day about noon was in York, but found the last sick one had died the day previous, making six. The remaining four appeared perfectly well. Inquiries regarding the symptoms and the post mortem appearances of two which had been examined by physicians of the place, satisfied me at once and fully, that it bore no resemblance to pleuro-pneumonia. One might as well mistake dysentery for asthma, as this for that. But they painfully suggested the possibility of rinderpest. Fortunately, the cattle had been kept close at the barn from the first, and as soon as infection was suspected, a rigid isolation was intentionally and judiciously kept up.

As nothing more then appeared needful to be done, I directed the premises to be disinfected and complete isolation to be continued for some weeks. Returning home, I read what my library furnished regarding the peculiarities of rinderpest, the effect of which was to increase my anxiety.

On the 16th, information was received of two more cases, and the herd was again visited. On seeing the cattle, I recognized or fancied that I saw characteristic symptoms of rinderpest additional to what had been reported to me on the first visit, and little was found distinctively different. The animals were both killed. The

morbid appearances corresponded substantially with those reported abroad; the differences not being greater than between the accounts lately from England and those given by Prof. Simonds in his report several years since of observations made on the continent.

Briefly, the symptoms were as follows:—The first which was noticed was described as “tremblings.” What I saw was a continuous twitching of the muscles of the fore-shoulders, occasionally extending to the flank, with now and then a tremor. These twitchings grew fainter as the disease progressed, and nearly or quite ceased before death. Watery eyes appeared very early, and before long, in most cases, they had a heavy look, with swollen and drooping lids. In one case a film appeared at a late stage. At first the dejections were natural, then diarrhoea set in which soon passed into dysentery, with fluid and very dark discharges, not very offensive, and some blood. Tenesmus frequent. Urine very deep colored and passed with difficulty. Temperature variable; at first feverish, especially about the horns, then colder. Coat staring. Rumination irregular and soon suspended. Some appetite for a day or two but not later; water was freely taken at all times. Pulse feeble and quick; after two days could hardly be felt. Respiration short and quick. In more than half there was a thick discharge from the nose. With several a sickly smell was noticed. In no case was there any moaning, violent motions, or any other indication of acute suffering, but in all a rapid prostration of strength and loss of vitality. Death ensued in from three to six days, one living until the ninth day.

The morbid appearances were: windpipe inflamed (this was noticed equally in one which showed no discharge from the nostrils); lungs and heart healthy; liver, spleen and kidneys but little affected; rumen (paunch) healthy and ingesta natural; contents of omasum (manifold) rather hard and dry, but not very much so. The passage from this to the abomasum (or fourth stomach) was highly inflamed, as well as the lining membrane of the whole of the fourth stomach and of all the remainder of the alimentary canal. The gall bladder was distended to unusual size, and its mucous membrane much inflamed. The lining membrane of the bladder exhibited a high degree of inflammation, and its color was rather darker than of the others. The chief seat of the disease appeared to be the fourth stomach and intestines. The lining membrane of these showed an unusual lilac or pale purplish hue.

Now these symptoms and morbid appearances correspond almost exactly with those described by Prof. Simonds in his elaborate report, to which reference was made, and from which extracts were given in my last report, (see page 106 et seq.) the principal difference being the absence, in the cases of York, of pimples or ulceration in the mouth, which occur in many cases of rinderpest. A description of the disease having been submitted to one of the best veterinary surgeons in the country, Dr. E. S. Thayer of Boston, he said it closely resembled rinderpest as reported, and was unlike any which had fallen under his observation, and he expressed a desire to be advised of the fact should other cases occur, as would probably be the case should it prove to be the veritable rinderpest.

Now in regard to the suggestion of a possible preventive. In Prof. Simonds' report occurs the following:—"It is evident that the morbid matter on which it depends having entered the system . . . soon acts upon the blood, by converting some of the constituents of that fluid into its own elements," &c. If this be so, rinderpest belongs to the class known as "zymotic" diseases;—in which progress is made by healthy atoms being converted into diseased ones by catalytic action, in a manner analogous to the changes which take place in fermentation. Now it is well known that the alkaline sulphites will immediately arrest fermentation, and, according to a late alleged discovery of Prof. Polli, of Italy, they also arrest morbid action of the sort above indicated. It occurred to me that here might be an opportunity to test their efficacy. Accordingly, on my second visit, I took a quantity of sulphite of soda and requested the owner to administer small doses twice daily to the remaining beasts, which he did—and the plague stayed—whether in consequence of giving a harmless salt, or merely coincident with it, I cannot tell.

I heard nothing more of the case until the 7th of August, or ten weeks subsequent to the last case in May, when notice was received of another and I went again and found one of the two remaining, (out of the ten first named,) to have died the day previous to my arrival. Mr. Freethy expressed much confidence that had the supply of sulphite first left been sufficient to allow its having been given a little longer, the case would not have occurred. More was procured and given to the one left, as well as to what he had meanwhile purchased, and I have heard nothing further up to the present writing, (the second week in December.)

It appears from recent advices from England that the sulphite of soda was used by several parties in England during the past season, and no case is known to have occurred where it was administered *as a preventive*. When given after the disease had made some progress, it failed to save the animal.

STRUCTURE, FUNCTIONS AND DISEASES OF THE UDDER OF THE COW.

When one calls to mind the great benefit derived by mankind in almost every stage of civilization, from the milk of the cow, he can not fail to admit that a knowledge of the structure and diseases of the organ by which that wholesome and nutritious fluid is secreted, is a subject of much importance. Inflammation of the udder, commonly called garget, frequently occurs, and is often injudiciously treated, and attended with very serious results. With the hope that it may contribute to a more successful management, I quote below, from an essay read before the Edinburgh Veterinary Medical Association by R. D. Brotherton. After some preliminary remarks, he thus describes the lactiferous organ of the cow, considered in relation to its structure and functions:

“The mammæ or udders (commonly called the bag), are those large glandular bodies that are pendulous under the postero-inferior part of the abdomen, between the thighs, in their distended state reaching anteriorly within a few inches of the umbilicus, and posteriorly as far back as to be almost on a level with the tendons of the gastrocnemii muscles. The aptitude of this situation is sufficiently evident to us all as being most convenient for the calf, offering the least hindrance to progression, and being most securely protected from external injury. Of all the animals in the class “mammalia,” none are possessed of mammiiferous glands of such an immense magnitude (in proportion to the size of the animal) as the cow. I am not prepared to say whether or not the domestication of the cow, and the apparent perversion of lacteal secretion from the use for which it was originally intended, may not in a great measure have contributed to the large size of this organ. One fact, however, would appear to contradict this opinion, and to prove rather that nature has not only intended them in this animal to furnish elementary food for the support and continuation of the mother’s offspring, but also to answer other purposes, by supplying man with a highly nutritive and pleasant beverage—from the

well-known fact, that although the lactiferous secretion in most other animals very soon ceases after the withdrawal of their young, and along with them the maternal sympathy, yet, in the cow, the functions of this gland are not for a considerable time interfered with, even if it may *never* have been subjected to the great exciting cause of the secretion—the presence and suckling of its offspring. I may also mention that the size of the organ is various, depending upon the age, breed, and time of parturition, and also in a great measure upon the frequency of the demands made upon it for a supply of milk; the health of the animal, and the nutritious quality of the food, combined with other circumstances, will have a tendency to augment or lessen its volume. The period also at which this lacteal secretion for the first time commences, is dependent upon circumstances—some breeds, as the French, Alderney, and others, being generally put to the bull from ten months to two years old. There is also, as is well known, a variety in the composition of the milk—some abounding in the butyrous, and others in the caseous principle—what some are short in quantity, is made up by its superiority in richness of quality. This may be accounted for by constitutional peculiarities, or by the greater energy of the functions of assimilation. The chemical analysis of milk furnishes us with the following contents, according to Berzelius:—

Water,	928.75
Curd, with some cream,	28.00
Sugar of milk,	35.00
Muriate of potash,	1.70
Phosphate of potash,	0.25
Lactic acid, acetate of potash, with a trace of lactate of iron,	6.00
Earthy Phosphates,	0.30
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“Thus, we perceive that milk is a compound fluid of an aqueous, caseous, and oleaginous nature, a fact easily proved by the spontaneous decomposition which it undergoes when allowed to stand in a vessel. From the fact, also, of its containing substances which are found in the chyle and not in the blood, many physiologists (among whom we may mention the immortal Haller,) have been led to infer, that the materials of which it is composed are

supplied to the mammæ from the chyle *by the absorbant system*. The resemblance, also, between the milk and the chyle may appear to favor this opinion. Many other hypothetical arguments are advanced in favor of this theory, but I think that the following statements are sufficient to prove it erroneous, and to establish the fact that the blood itself furnishes this (as well as all the other glands) with the requisite material for secretion:—1st, No anatomist has as yet discovered or described any lacteal vessels coming from the mesentery to the udder; 2d, Purgation of the suckling cannot be produced by any medicine administered to the mother, *unless this medicine is quickly absorbed into the circulation*; 3d, The fact of injections passing from the arteries into the excretory ducts of the glands; 4th, When the secerning powers of the gland have been exhausted, *blood* has been drawn from the teat; 5th, From analogical reasoning or deductions, we may infer that as nature does not frequently deviate from her usual laws for trifles, the mammæ, with every other gland (the liver excepted), is furnished with material for secretion by the *arteries*.

“Previous to making any remarks on the function of secretion, it will be requisite to glance at the general anatomical structure of the udder; and, beginning from without, notice first what we find *externally*. In common with the other parts of the body, the udder receives a covering of the common integument, but of such a character as to be able to adapt itself to the changes in size which the organ undergoes, being soft, pliable, elastic, and but partially covered by long and soft hair. In shape it is imperfectly hemispherical, and artificially divided (externally) by the skin into four quarters, and to each quarter hangs an appendix called the papilla or teat, giving it very much the appearance of a round-surfaced funnel. If the quarters differ any in size, the two anterior are generally the larger.

“The teat is an inverted cone, formed from a continuation of the covering of the udder, but having more cuticle on its surface, to prevent the effects of friction to which it is exposed from suckling or milking. Its dependent portion is contracted, and each teat is perforated by an opening that communicates with the interior of the gland. Some few muscular fibres also are found in its substance, which, together with a kind of valvular apparatus in its internal part, formed by the cuticle being continued up the sides of the perforation and then terminating in an abrupt or corrugated manner, where the contraction ceases, will assist in preventing the

column of milk escaping spontaneously, which we sometimes have witnessed in large and full udders, the weight of the fluid overcoming this provision. Thus we perceive by what a simple and easily-formed contrivance *nature* manages to overcome what would to us be great obstacles, and what perhaps would have puzzled some of our best mechanics to have discovered—so simple, yet so effectual in its design.

“ Proceeding inwardly, and immediately under the skin, we find an intervening cellular tissue, uniting loosely but firmly the skin to an expansion of elastic fascia, by which the gland is enveloped, rendering it stronger and more compact. This fascia and cellular membrane also detach several portions into the interior of the glandular structure for the same purpose. In this glandular structure, as in other secerning organs, we find arteries, veins, absorbents, excretory ducts, a small portion of fatty matter, and cellular tissue; but of the intimate arrangement and disposition of these various tissues, but little is as yet known. The udder being a conglomerate gland is formed of numerous lobules united together by cellular membrane. Each of these lobules is principally constituted of arteries, veins and ducts, and though almost too small for demonstration, yet we infer that each lobule is a small gland that performs as perfect a secretion as the whole accumulated glandular mass. The minute structure and disposition of these lobules has given rise to as much anatomical disquisition as that of the arrangement of the air cells in the lungs. Neither can we admit that microscopic investigation has placed us on a surer footing in this respect; in fact, the primary and essential modes in which all bodies are composed and arranged, is a subject beyond the grasp of the human intellect, however laborious, inquisitive, or penetrative its researches may be; and whatever unwillingness may be manifested by an interrogative aspirer prior to his subscribing an assent to the declaration—“ thus far shalt thou go, but no farther ”—still the simplest and most uncomplicated structure in the field of nature presents us with something inexplicable, if our inquiries are pushed to their furthest extent.

“ The question has frequently been put to me, where or in what is the milk contained previous to its abstraction from the udder by the teat? The plebeian will tell us in the *milk veins*! And, to be candid, how many of us are there who did not in former years harbor this opinion, having (no doubt) received it by *tradition* in our youth? But when “ philosophy throws away the veil that

exists between nature and the ignorant," then false notions, however closely they may be clung to, must give way to those ideas obtained from our own examination and judgment of structure and function.

"But lest you should charge me with flying off from my subject at a tangent, let me proceed to make some few remarks on those canals in the interior of the udder which contain the milk. No doubt you will recognize them under the name of *excretory ducts*, and it must at once strike you that they must be very numerous and capacious, in order to hold from six to eighteen quarts of fluid.

"These ducts are supposed by some to be continuous with the minute ramified terminations of the arteries that supply them with fluid; by others, that between those terminations and the commencement of the ducts some structure is interposed, through which the blood is infiltrated and changed; whilst it is the most general, and I think the most probable opinion, that in the substance of the organ are many areolæ or cells, in the interior of which the arteries ramify and deposit the milk, which is conveyed by the excretory ducts into larger receptacles, with which the gland is furnished, whilst the superabundance of blood and the "residuum of secretion," are carried again into the circulation, the former by the veins, the latter by the lymphatic vessels. The shape and disposition of these excretory ducts are not unworthy of our notice. In shape they bear considerable analogy to the papillæ or teats. We previously noticed that the teat is so formed as to prevent the loss of milk by gravitation, but if there were no other provision against this, the weight of the accumulated fluid must inevitably overcome it. But nature always adapts her means to the desired end, and has in the interior so formed the canals as to resist the pressure from above, by the converging terminations of smaller into larger ducts, being, like the teat, contracted, and provided with a valvular fold of the lining membrane. The same law is also observed throughout, to the communication of the ducts with the teat. The canals do not, in an uniform manner, keep growing from a smaller to a larger size, but in various parts of their course are considerably dilated. These dilatations or sacs answer the purpose of reservoirs, have their inferior portions contracted, and are placed in an oblique direction, are provided with valves, thus preventing the accidental loss of milk, and also its retrogression. On this account it is necessary that the teat should be elevated, and the udder gently pushed upwards in the operation

of milking, in order to open the valve, and dislodge the milk. Were some of our dairymaids to take a lesson from the calf or colt on this subject, and mark how they instinctively, and with pleasure to the mother, obtain the milk from the gland, we should not have so many vicious cows, so many diseased udders, or sore teats."

He then goes on to speak of the Symptoms and Treatment of Inflammation of the Udder of the Cow, as follows:

"Having briefly run over the general anatomy of the udder, we shall be better prepared to consider it when in a morbid condition. Although there are few organs in the body more liable to disease than glands, yet how few pages in our veterinary pathological works do we find devoted to their consideration? The reason why we do not see a larger number of these cases, may arise from glands being but low in the scale of sensibility, not receiving a large supply of sensitive nerves, thus preventing the animal from manifesting symptoms of pain. We have frequently seen the liver, spleen, and other glands almost disorganized in consequence of previous disease, and yet the animal has never been noticed to evince the effects of pain. Inflammation of the udder (or, as it is commonly designated, '*garget*,') is a disease of frequent occurrence in milch cows, most commonly sudden in its attack, rapid in its progress, and often productive of irreparable injury. It may have its seat in the glandular or cellular structure, but frequently involves both these, as well as their cutaneous covering. The symptoms are these ordinarily produced by inflammatory action, and are so palpable as scarcely to require mentioning. We shall find heat, swelling and pain, with derangement of function in the gland, and not unfrequently more or less constitutional disturbance. The disease generally commences in one quarter of the udder, which becomes hot, enlarged, and has a peculiar hard and knotty feel. But as inflammation is very apt to spread where there is continuity or contiguity of membrane, the other quarter; or perhaps the whole udder, becomes involved. The milk is considerably reduced in quantity, and of a yellowish color, by the admixture of serum and lymph, which becomes coagulated, and gives it that curdled appearance so often witnessed in these cases. As the disease advances, we shall find that the secretion of milk is entirely suspended, and that in its place blood, lymph, or pus, is effused in the interior of the lactiferous tubes. When the cellular texture is chiefly involved, we shall find considerable tension of the skin, in consequence of effusion having taken place in the cells, and very

often in these cases there is puffiness of one or both of the posterior extremities. In other cases, the skin will exhibit indications of erysipelatous inflammation, appearing red, and the redness temporarily disappearing on pressure being applied to the surface by the finger. The swelling and consequent tension are not to a great degree prior to the vessels unloading themselves by effusion, which they may do on both surfaces. After this has taken place, the redness and acute inflammatory action ceases, and then the skin assumes a yellowish tint. But when the internal structure of the gland is affected, it is by far the most dangerous in its consequences, and the most difficult to treat. With the local inflammation we have always more or less constitutional or sympathetic fever, varying in intensity according to the degree of nervous and vascular excitement caused by the local irritation. We may also notice that the subcutaneous abdominal or milk veins are generally distended, the return of the venous blood being impeded in consequence of the swelling.

“It may be observed that the cows yielding a large supply of milk are most liable to this disease, and it has taken place in heifers, from being in too high condition, even previous to their ever having given any milk, and cows whose udders have been dry for months are not exempt. The causes of this complaint are numerous, and it is very often complicated with the epizootics that prevail in some seasons of the year, and in certain localities. We shall divide the causes into those that place the organ in a state of susceptibility for the attack, and hence called the *predisposing*, and those that are the immediate agents in its production, generally called the *exciting*.

“I have seen the disease attack cows from being put into too luxuriant a pasture, either soon after the suspension of lactation, or when near the time of parturition, and particularly those that are unaccustomed to the climate. Neglect of abstracting the milk, or the operation being performed in an improper manner, may also be included. The sudden commencement of the secretion, or what is called the ‘springing’ of the milk, calling for a large influx of blood into the vessels, or badly drying up the gland, and leaving portions of milk to be absorbed into the system, are frequent causes. Exposure to cold and wet in the field, cold currents of air coming in contact with the animal in the cow-house,—the animals standing with their legs or udder in a pit when drinking, may also induce the disease. The exciting causes are external injuries,

such as the viscus being gored by another cow's horn; being kicked or trodden upon when standing or lying in the cow-house; bruising the udder by lying carelessly upon it; having too little straw under it, or by lying out in the autumn, amongst cold and wet grass. Permitting the udder to be loaded and distended by an accumulation of milk, and the practice of 'heifting,' are frequent causes. I once saw the disease produced by a youth being in the habit of inserting straws in the teat to draw off the milk. Professor Dick also mentions that it may result from cow-pox. Disease of the teat and obstruction of its perforation, by not allowing the milk to flow, but to lodge in the ducts, which will act as an irritant, and produce inflammation, in the same manner as retention of urine causes cystitis. From the well-marked sympathy between the udder and the uterus, the irritation caused in the latter by the retention of the placenta, will frequently extend to and involve the former in disease. Derangement of the maniples and abomasum, or of any portion of the alimentary canal, will frequently cause disease of the udder. In fact, it appears to me that the causes inducing an inflamed state of this important viscus, are far more numerous than have generally been supposed by what few authors have written on the subject.

"Garget assumes both an acute and a chronic character, and this distinction will, to a certain extent, modify the nature and application of our remedies. It may terminate in resolution, suppuration, obliteration by condensation and induration of the glandular structure, and in gangrene. But, properly speaking, these cannot be called its ultimate terminations (with the exception of the first,) but rather its consequences—as the inflammatory action may still be existent in some of the surrounding portions of the gland, whilst there is suppuration and mortification in the other. Restoration and death, in my opinion, are the only two ultimate terminations of disease.

"The *treatment* must at all times be moderated by the nature and intensity of the symptoms exhibited, and will in a great degree be influenced by the cause that originated them. We must first endeavor to discover whether there is any immediate exciting cause still in operation, as the lodging of thorns, or of splinters of wood, accumulations of milk, or obstructions to its flow, and our first indication will be to remove these. If the udder be distended with milk, let it be withdrawn either by gentle manual operation, by permitting the calf to suckle, or if these give the animal much

pain, by the introduction of a mechanical apparatus in the form of the teat canula, or the tabular portion of a common quill, into the teat, through which the milk will gradually gravitate. The removal of these exciting causes simply, will very speedily produce a mitigation of the symptoms, and afford the animal considerable relief. In some parts, from some popular *belief*, or perhaps *disbelief*, the farmer refuses to draw off the secretion before the parturition of the cow, although the udder may some time previously have been distended, almost to bursting; but this must be insisted upon, or bad consequences are likely to follow its neglect; and if the function of secretion is very vigorous, let the fluid be more frequently abstracted. On the same principle, any offensive or irritative matter in the uterus must be removed; and if the stomach or digestive canal be suspected, let them be regulated by cathartics, tonics, or stimulants, as circumstances may require. If after having got rid of the exciting cause, or if its removal cannot be effected, the inflammatory action proceeds unabated, we must have recourse to decided antiphlogistic measures. Of these the ancient practice of bloodletting stands the foremost, and is absolutely necessary when the local inflammation and the constitutional disturbance are great. In this case we shall probably find the animal with a quick pulse, laborious respiration, anxious countenance, costive bowels, diminished appetite, suspended rumination and lactation, and manifesting general nervous excitement and great pain.

"According to the violence of these symptoms must be the energy and extent of our general treatment, in order to check their rapid progress, and to prevent their fatal consequences. No law can be laid down as to the exact quantity of blood that circumstances may render it necessary to abstract,—the general symptoms, the state of the *pulse*, the general plethora of the system, the age, strength, &c., &c., of our patient, must be considered as guides on this point. It is the effect, and not the quantity of blood that we wish to obtain. From four to eight quarts may be stated as the general quantity required, taking care that it is abstracted in a full and free stream, in order that we may make an impression on the force and activity of the circulation, by giving it a sudden check, and prevent the vascular system accommodating itself to the gradual loss of blood drawn by a small orifice, which reduces the bodily strength, while it does not alleviate or prevent the determination of blood to the suffering organ. It is of no importance which vessel we chose for this purpose, the jugular

or the subcutaneous abdominal vein ; but I give a preference to the former, having in many instances found a difficulty in pinning up the latter after the operation, and also, from the looseness of the integument, the cellular membrane under the abdomen is very liable to sanguineous infiltration from the orifice of the vein. As there is congestion or determination of blood in an inflamed part, it would be advisable, if *practicable*, to detract blood locally from its immediate vicinity. This is generally done by leeches, scarifications, or incisions ; but unless in those cases where the inflammation is superficial, as in the cellular membrane or skin, I do not see the propriety of their use. Incisions through the integument in a longitudinal direction have been of service where the skin is principally involved, when there is much tension and subcutaneous serous effusion. By this means the distended vessels are unloaded, the serous effusion evacuated, the tension relieved, and the disease is gradually drained away by the suppurative process which follows. But we would only recommend incisions after other local and constitutional remedies have failed. Blood-letting must be followed by the administration of a cathartic, the importance of which in cattle practice is well known. The following is the formula we generally adopt : Epsom salts, from half a pound to a pound ; sulphur, quarter of a pound ; caraway seed and ginger, two ounces of each, mixed in a quart of warm water, to which may be added a little molasses, to render the drench less irritating to the superior part of the air passage. By these means we shall not only cause evacuation of the fecal contents of the intestines, but also get rid of a large portion of the thinner part of the blood by secretion and excretion, stimulating the functions of the liver and skin, restoring the balance of the circulation by determining blood from that organ which already possesses too much, to other parts of the body, and will be an important adjunct with blood-letting in lessening the morbid susceptibility of the diseased part, and in promoting a healthy state of the organ.

In the subsequent treatment, sedatives, tonics, or diuretics may be given, according to the degree of fever or debility that may supervene ; but it will seldom be found requisite to do more than keep the bowels in a regular state by small aperient doses : Muriate of soda (common salt) is objectionable as a medicine in this disease, as it has a greater tendency than other *cathartics* to retard the secretion of milk.

“After having combated the constitutional symptoms (if any,) our next object must be to remove the local inflammation, for which purpose we use direct applications to the part itself. Amongst these, hot fomentation is perhaps the most *beneficial*, where the inflammation is established in its most acute form. It may be with water as hot as a person can bear his hand in, and the temperature kept up, or the water may be medicated to suit the fancy of the proprietor,—as it is the heat and moisture which are of utility in allaying the irritation, by relieving the deeper seated nerves from pressure, causing cutaneous transpiration, relaxing the vessels, and promoting effusion. If that benefit does not arise from this remedy which is expected, it is frequently because the fomentation is not persisted in a sufficient length of time, or for want of water of sufficient heat. Four times in the course of the day, and an hour each time should the application be made,—having a large vessel, continually supplied with water of a proper heat, placed under the cow, and a person on each side of the udder, who, with a large woollen cloth dipped into the water at intervals, and applied to the udder, so as not only to foment, but to suspend it. A poultice of bran or linseed may then be applied, but are rather objectionable on account of their weight. The udder may also be suspended by a broad bandage passing from beneath it to the loins, with a slip posteriorly between the hind legs, to meet the other at an angle. This will assist in relieving the pain, and prevent the weight of the udder causing such an increased determination of blood to the part. I would not recommend any stimulating application until the violent inflammatory action has somewhat abated by the preceding treatment, which may be repeated, or carried to its fullest extent, as circumstances may require. After the more active stage has been somewhat subdued, a cooling liniment may be rubbed on the udder after the fomentations. Any of the following may answer:—Acetate of lead, 2 drachms; water, 1 pint; neat’s foot or olive oil, 1 pint;—shake, when a saponaceous fluid will be formed. This I have found to answer well in many cases. Solutions of the acetate of lead, of nitre, or of sal ammoniac, in water, with vinegar or spirits of wine added, are often made use of, according as a cooling, evaporating, or discutient lotion may be wanted. Ointments are also recommended by some practitioners, but are more applicable to a chronic stage, as the friction necessary for inunction will tend to irritate a glandular swelling in its acute form. They

may be used where stimulants are required, in order to remove the stagnated blood, by rousing the dilated vessels into action. Camphorated elder ointment, with a little mercurial ointment added, is recommended by Mr. Youatt. Camphorated spirits, with oil of origanum, or olive oil, turpentine, and camphor, or lime water, linseed oil, and spirits of turpentine, in varied proportions, will form liniments that may be well rubbed in, when the tenderness of the part is removed, but swelling remains. As I live on the sea coast, I have been in the habit of using decoctions of seaweed (commonly called tang) in sea water, and have found it of use in removing the swelling left after an acute attack. Perhaps it may act on the absorbents, from the portion of iodine that the seaweed contains. Iodine ointment is a good application.

"We must not forget to have the udder emptied of its contents two or three times in the day, by being milked, if there is no obstruction, or much tenderness in the teat. If the latter be the case, the tube already mentioned had better be used, as the disease may be increased by the irritation of milking by the hand, caused in the diseased teat. It will sometimes be found necessary to make a longitudinal incision into the teat, in order to remove the coagulated milk or blood from the termination of the ducts, which may be done by the introduction of a probe. The animal should be kept as quiet as possible, and have thin gruel, malt, or bran mashes, with a little sweet hay, and chilled water. If, however, all the means to which we have resorted should fail in producing what is most to be desired—resolution of the inflammation—the attack may proceed unsubdued, and produce suppuration, abscess, gangrene, or even death itself, by the violence of the symptomatic fever. If the swelling, fever, and pain increase, the bleeding and purging may be renewed, and the fomentations continued, if the animal can bear further depletion. In some cases large effusions of serum will take place, and form dropsical tumors in the vicinity of the udder, or immediately under the integument enveloping it. These must be evacuated by the lancet, and treated by emollients in order to induce suppuration. Setons, also, may be inserted in the surrounding parts, which may cause revulsion, and act as drains. If the discharge from the udder be great, debility may be the consequence, when recourse must be had to gruel, port wine, and the vegetable tonics, or if there is no debility, diuretics may be of service.

Suppuration frequently takes place either in the subcutaneous

cellular tissue, or more commonly in the interior of the glandular structure, at the central part of the consolidated lymphous deposit from the vessels, which causes that hard and knotty feel of the udder under inflammation. When superficially seated, the presence of pus may soon be detected by its naturally tending to the surface; we must not permit its spontaneous evacuation, but give free vent by a dependent incision with the lancet or bistoury, and thus leave a clean-edged wound, which may afterwards be treated by astrigent washes or injections. But when suppuration takes place in the interior structure, it is often productive of serious results; being deeper seated, pus does not readily reach the surface, but burrows in various directions, by means of the lymph forming canals around the circumference of the pus, called sinuses. These sinuses may be numerous, and ramify in various directions through the inner structure, and three or four empty themselves into one, which, on attaining the surface, bursts and discharges a purulent unhealthy matter. The existence of these sinuses, and the constant discharge (which must be great from many of them) soon weakens the animal and disorganizes the udder. The fistulous ulcers thus formed, or those formed by the bursting of the abscesses, are difficult to heal, and should if possible be prevented by allowing previous evacuation to the matter by the lancet at that point in which it is preparing to burst. If, however, the case has been neglected, if abscess, sinuses, and ulcers have formed, from the danger of gangrene, and from the weakening of the constitution, we must have recourse to antiseptics and tonics, and endeavor to obtain a healthy action of the parts by the application of a solution of the chloride of soda or lime. We may insert a piece of caustic potash in the sinuses, or inject them with a solution of corrosive sublimate, in order to obliterate their canals and suppress the unhealthy secretion. Should this treatment succeed, it invariably leaves the gland in an indurated state, and stops further secretion from the quarter which was affected. In some cases, where the intensity of the inflammation is such as to cause a complete stagnation of blood, and consequent stoppage of circulation through the vessels, the part, from want of nutrition, loses its vitality or mortifies. The affected parts will become cold, black, insensible, and have a foetid smell. Incisions may be made into it with a sharp instrument, but no blood flows, and the animal evinces no pain. Large sloughs are occasionally detached and fall off, while the surrounding parts are soon all involved if its

progress is not immediately checked. This can only be done by the removal of the dead and dying portions by a surgical operation. In performing this operation the principal objects to be borne in mind are—1st. To remove every portion of the dead part. 2d. To leave a sufficient quantity of integument so as to allow the edges to be brought together by suture. 3d. Properly to prevent bleeding by securing the mammary arteries by ligature, and some other smaller branches by ligature or torsion. The nature of the incision will depend upon the extent of disease, and the after treatment will consist in supporting the parts by a bandage, and in keeping up the strength of the animal as much as possible by the means we have already mentioned, keeping the wound clean by simple dressing, and promoting adhesion or granulation according to the indications presented. This is the only means, under these circumstances, of saving the animal's life, and of giving the owner time to make her serviceable by feeding for the knife. This operation has been successfully performed by Professor Dick and by Mr. Bowie, and by other veterinary surgeons.

“ We have now but a few remarks to make on chronic inflammation of the udder, and on one of the consequences of the acute, viz., induration of the gland. The chronic inflammation is but a sequel of the acute; there is little or no pain, generally swelling and hardness, but no heat. The milk is lessened in its quantity, the animal's appetite diminished, but little or no constitutional disturbance is present. If not removed, the secretion of milk gradually and slowly ceases, and the affected portion is called a ‘blind pap.’ It is often very difficult to restore it from this chronic and indolent state to its wonted vigor, although much success has attended the use of iodine and its compounds. It is a very useful application to glandular enlargements when of long standing, and is the most to be depended upon in induration of the udder. It is used both internally and externally. For external use, 2 ounces of the tinct. iodine mixed with 2 ounces of soap liniment will form an embrocation, or 1 ounce of the iodine to an ounce of lard will form an ointment, which, if well rubbed on the diseased part, with plenty of friction, will frequently succeed in causing absorption of the tumors. The iodine in half-dram doses may be given internally. A respectable authority recommends the internal administration of hydriodate of potash. I have given it both to the cow and the horse in 4-drachm doses, without any other than a diuretic effect. If this is the effect that is wanted, we have better and

cheaper diuretics in our pharmacopeia. I also think (and that from experience) that the ointment of hydriodate of potash is far inferior to those made from iodine itself, or from some of its compounds with mercury. In chronic garget the use of these remedies must be continued twice in the day, and often for a considerable time, before any benefit is derived, taking care that we do not cause absorption of the gland itself.

The induration of the affected quarter or quarters is a very frequent consequence of garget, in which case we have obliteration of the functions of the gland, with the restoration of the animal's health. This is produced by a cessation of the inflammation, and a subsequent consolidation of the cellular and secreting textures of the gland. It is seldom of a malignant nature, like cancer, but remains stationary and indolent throughout the animal's life, producing no irritation in the surrounding tissues. When this is the case, no treatment is necessary, as it cannot be cured. If the tumor, however, should put on a malignant character, which it sometimes does, in consequence of being roused by external injury, in which case renewed inflammation is set up in the surrounding parts of the adventitious deposit, that which had hitherto been harmless now spreads with rapidity and involves the other structures, which become converted into a substance like itself. Ulceration and suppuration frequently supervene; and if the whole malignant substance is not removed by operation, death must inevitably result from the great excitement of the system. But as this is not a common result, we look upon induration as that consequence of inflammation most to be desired after resolution. It detracts from the value of the animal as a milch cow in proportion as one or more of the quarters are thus affected, but it does not prevent her from being consigned as a feeder. I may also mention that numerous instances are known of those quarters of the udder, thought to have been thus obliterated, again secreting after a succeeding parturition; but I think that another quarter more frequently becomes dry, than that one in this state again resumes its function."

THE COLLEGES FOR THE INDUSTRIAL CLASSES.
CONTEMPLATED BY THE ACT OF CON-
GRESS OF 1862.

During the past year, several communications appeared in the *Maine Farmer*, which comprise the results of a more thorough and exhaustive examination of their subject matter, than had before fallen under my observation. Desirous to give them a wider circulation and a more permanent form, they are, with permission of the author, embodied in the State Agricultural Document of the year.

“AGRICULTURAL SCHOOLS.”

MESSRS. EDITORS :—You copy, in the last *FARMER*, an article under this title, from the newspaper called *The Nation*. As you thus give currency, if not approval,* to the views put forth in that article, I respectfully submit, that those views are entirely incomplete, and therefore unserviceable, in their supposed application to the new question of “the liberal and practical education of the *industrial* classes” in *this* country, and especially in this part of it.

The chief assertions of the writer in the *Nation* are to the effect, that the agricultural schools of Germany, after the experience of fifty years, are now regarded with less favor than heretofore,—that “strong objections” to them are developed—that it is now coming to be thought better to establish agricultural chairs or professorships, at the great universities—that, at Halle, such a professorship was established three years ago, and that this new department has many students—that a similar professorship was established at Leipzig last year—that the “richer universities” have collections, apparatus, libraries and cabinets superior to the agricultural schools—that there is no need of large farms to teach the practical details of the farmer’s business—that it is enough to teach the general *principles* of the sciences at these splendid universities, and that agricultural *practice* may be learnt at home, &c.

* The editors of the “*Farmer*” expressly disclaimed such approval.

How much of this may be new and true, as regards Germany, I have not the means of knowing—but precisely similar assertions, put into the form of general argument, are, unfortunately, not new here. Ever since the Congressional endowment was granted in 1862, the air has been full of this kind of appeal in favor of the existing universities and colleges, as against separate “practical” schools for the “industrial classes.”

But there is a broad and deep question, which the writer in the *Nation* leaves wholly untouched—one which controls the whole problem in Germany, as it does also, though in another direction, in the Northern States of America. To what sort of population is it, that the German universities are adapted? Are the populations of the German States homogeneous, and all substantially of one grade, like ours in Maine? Or are they deeply and unchangeably divided by distinctions of rank, and class, and *caste*? Is there not there, the widest and most impassable distance, between their superior, educated classes, and the actual hand-workers in the fields?

I am not personally familiar with German life, but I suppose that generally, in Europe, the hand-workers—the *peasantry and mechanics, especially the agricultural peasantry*—are not supposed to need any except the most humble education—in some parts of Europe, not any at all. They are not expected to rise in the world, or to improve or even to change their condition. It is looked upon as a matter of course, that they shall be hand-workers all their lives, even to old age. In many European countries they never own land—do not in fact own anything, but their bodily strength, and the only profit they get from that possession, is a bare subsistence.

This class is very numerous, and many of the countries, in which they live, are populous and rich. It follows, of course, that the labor of this humble class must be directed by a superior class. The landed proprietors, by themselves, or by their stewards and overseers, employ this labor, and wish to employ it profitably. Hence it follows, that the superior classes, who are wise for themselves, desire the advantages of superior education, and, for centuries, they have had the most liberal provision and abundant means for their own general education; and now, if the statements of the *Nation* are correct, they are adding improved courses and professorships of modern science, including agriculture, to the curriculum of their ancient universities. Beyond all question,

it is from these superior grades of their society, that the new departments of agriculture, in the German universities, draw their attendants. When we hear that the German *peasants*, are leaving their fields to attend lectures at Leipzig and Halle, *expecting to return and resume their peasant life*, we shall then have a German example, that will give us something interesting and wonderful, if not something useful.

In fact, long ago, the difficulty of this great problem of *caste* was encountered even in the "agricultural schools" themselves, in Europe. In some of the most distinguished and most useful of them, they have attempted to carry them along, with two sets of pupils—one from the higher ranks, destined to be proprietors and overseers, who are not instructed in any actual work, and who pay tuition—the others, from the humbler classes, who receive a lower training, a part of which is labor, and who pay little or no fees. The difficulties of such a system are obvious enough, but they are unavoidable, in their existing social condition. A remarkable instance occurred at Cirencester in England, one of the most splendidly endowed and most promising agricultural schools in Europe. [One or two statements of detail were here made, in the original article, which were found to be erroneous. The correction appears in the second article.] This really fine institution, with admirable appointments of every kind, including very distinguished professors, whose names are seen, every day, in our agricultural books and journals. is, in fact, and has been, for a long time, in a languishing condition. But let an agricultural chair be established (if such a thing can be conceived) at Oxford! or Cambridge! and filled by a man of note as well as ability, and without doubt, a very respectable number of the sons of noblemen and gentlemen, would enter their names as attendants upon the lectures.

I would not say, that it is precisely the same sort of feeling, that gives popularity to the new agricultural departments at Leipzig and Halle—for the Germans are vastly more sensible, and more in earnest about such a matter, than the English are—but, to come back to the point before stated, it will be many years, I think, before the laboring peasantry of the German States will be found flocking to the lectures of Professor Kuhn or Professor Knop.

We can make an illustration close at home. Suppose, that at any time, in the Southern States, it had been under consultation, among their public enterprises, to provide a special and higher education in sciences relating to agriculture, and that some one had •

proposed to do this, by separate agricultural schools, in which the actual field laborers—the hand workers—the *peasantry* of the South, should receive superior training both in the sciences and in the practical details of agriculture—is it necessary to imagine what would have been the answer to such a proposal? Everybody can supply it. Everybody sees that the proposal would have been repelled as the grossest absurdity. The counter proposition would have rushed swift to the lips of everybody else in the consultation—“That is not suited to our condition of society; what we need is to educate our own sons—the young men of the superior race—who are hereafter to be our planters, and managers of estates, so that they can profitably direct the labor of our working class. It is not necessary that *our* young men should be trained in practical labor, and in the application of principles, by their own hands. Our object will be sufficiently subserved, by establishing agricultural chairs and scientific departments, in our present colleges and universities. This will do all that we need for gentlemen’s sons, who are to be the *directors* of our agricultural labor,” &c., &c.

Perhaps we may, at some time, obtain from the writer in the *Nation*, his view of what the difference is, essentially, between the arrangements of *caste* in a Southern State, and those in a German kingdom—Wurtemberg for example. And since a part of his argument is drawn from the case of the farmers’ school of Hohenheim, in that kingdom, where he would have us believe that things are not working well, I have gathered a few statements about that school from Flint’s very minute and recent account of it.

He tells us that, besides a “school of forestry” it was originally established, and still subsists, under the form of “distinct schools.”

“1st. The Institute or School of Agriculture for *young gentlemen*.

3d. The school of practical farming, *for the sons of peasants*.

Pupils in the higher paid (at first) \$164 for tuition, lodging and board; afterwards \$41 for tuition and room, getting board where they pleased.

The School of Practical Farming was begun with boys from *the orphans of Stuttgart* and other cities. These boys had but one instructor, who had to keep them at work, and train them to the greatest possible activity.

This practical school was modified—and, instead of taking orphans, the sons of peasants especially, were to be admitted.

The students of the *higher* institute are admitted without examination, are held to no very rigid discipline, they employ their time as they choose. Many sons of wealthy families are no doubt attracted there, by the beauty of the institution for an agreeable temporary residence.

It may be proper to remark that there is a sort of impassable, aristocratic barrier between the institute pupils, and those of the school of practical agriculture."

Every word above is quoted from Flint, who was on the spot, less than three years ago; and I submit, that the writer in the *Nation*, has no just ground for urging upon us the example of Hohenheim, (upon this fundamental question, *who* is to be educated, and *how* are they to be educated?) whether Hohenheim is working well or ill—gaining in favor or losing. If it is doing well, it is according to the Wurtemberg standard of social conditions, and class populations. If it is doing ill, the chances are more than equal, that one great reason is the fatal curse of *caste*, from which the New England populations are free.

Let Hohenheim only drop out her lower school for the sons of peasants, and then she would be exactly suited for one of our Southern States. And I submit, whether the alleged favor shown to the new agricultural departments at Leipzig and Halle, may not be simply an indication that the tyranny of caste is working the other way, and the "sons of gentlemen and wealthy families" are finding it more agreeable to go to the universities than to Hohenheim.

I had intended to carry out in this article, the other side of the question—our own side—but time and space prevent. I will resume it at another time.

P. BARNES.

Portland, Feb. 22, 1866.

AGRICULTURAL SCHOOLS—No. 2.

What I wrote, in my former paper, respecting the Agricultural College at Cirencester, in England, was set down, at the time, from memory of the accounts given by Mr. Henry Colman, President Hitchcock, Mr. Flint, and others. Referring in fact, to some of these authorities, I find that a part of my statement of detail was erroneous, but the general facts are fully confirmed, and the object for which I adduced this example, is most significantly made out.

President Hitchcock, who was there in 1850, says:

"Those residing in the building, pay \$355 annually; those who board elsewhere, \$175. Formerly, the school was open for the sons of the smaller

farmers, but could not find support on that plan, and it was found that if *these attended, the wealthier classes would not send their sons*. The price accordingly has been raised, and *none but the sons of gentlemen, such as clergymen and wealthy laymen, now attend*. None of the *nobility* send their children."

Mr. Flint visited the college in 1862, twelve years later, at a moment, when the professors were resigning, and the institution was in a crisis of difficulty. He says:

"A mistake appears to have been made at the outset, by fixing the charges too low. It was designed to meet the wants of those young men, sons of farmers, who *wished to prepare themselves for stewards or bailiffs*, and who could ill afford to pay even the £30 (say \$150) which was the amount fixed, including board and tuition. *Small farmers could not send their sons, and rich ones would not.*"

Under a new management, he says:

"They raised the charges. The institution still lives, with about sixty students, now consisting of the *sons of the rich*. The charges now are £90, \$450. The farm appeared to be under a good state of cultivation. *All the labor is hired*, the regular farm wages being *seven shillings a week*, the laborers finding themselves. That is twenty eight cents a day."

These last statements tell the whole story. Compare the young *gentlemen*, who are the *students* of this college, and pay \$450 a year for their board and education, with the *peasant laborers* on the college farm, who are paid twenty-eight cents a day!

The object of adducing these examples in this discussion is, to show how inapplicable are any supposed analogies drawn from the European institutions, to the questions now before the American people, relating to "industrial colleges." And by so much the more, as we see and feel, clearly, the degradations of low *caste* in European society, shall we apprehend, the more distinctly, the peculiar and original problem now under discussion among ourselves, where we have no *permanent* class distinctions at all, and where, in respect to the temporary diversities of fortune and pursuit, the very precise object before us is, not—to educate the *gentlemen classes*, but—the "*industrial classes*."

Before renewing the discussion of the argument used by the writer in the *New York Nation*—that it may not be well for us to have separate agricultural schools, because, as he says, in Germany, such schools are now in less favor than heretofore, and it is thought better to have professorships of agriculture adjoined to their classical universities—it is proper to say, that no such ques-

tion as that of purely agricultural schools, is presented to the American public by the act of Congress of 1862. That act does not contemplate nor provide for institutions designed to teach only the sciences of agriculture, and the art of farming. It embraces a great deal more. True it is, that on account of the great prominence of agriculture in our American life, and, especially because enlightened farmers and persons attached to the agricultural interest, have taken a more notable hold of this matter than anybody else, it is usual to think of these new institutions, chiefly in their connection with agriculture; and, in common parlance, and for a convenient appellation, we speak of the "agricultural college" of Maine, or of Massachusetts, when we refer to the institutions founded under the act of Congress. But this name is only partly correct, and the writer in the *Nation* is entirely in error, when he seeks to draw from the alleged case of Hohenheim—a strictly agricultural school—an argument for merging our "*industrial colleges*" in the existing universities and literary colleges of this country.

To resume the discussion of the great problems which lie underneath all this comparison of the classical university and the proper industrial college,—namely—for what sort of populations, are these different means of training properly designed? *Who* are to be educated in the industrial college, and *how* are they to be educated, and with *what ends* in view?—the examples of the argument must be drawn, in *our* case, from the actual ranks of the actual persons, who compose the industrial, or hand-working class of our own communities, and who necessarily compose the immense majority of every State, in the northern parts of our country.

For the strong lesson of absolute contrast, we have instanced the European peasant, for whom there is no future, except the simple continuance of his peasant life to the end of his days, and who is not only himself ignorant that he needs any better culture, but who is surrounded by those who are equally ignorant, or wickedly indifferent, as to any improvement of his lot. We have instanced the negro field-laborer of the South, for whom, though a great light has dawned upon him, it is still a matter of struggle, what his future is to be, and a matter of doubt, how long that struggle may last.

But nobler and more hopeful specimens of young manhood engage our attention in the Northern States, and especially in New

England. Here, in the State of Maine alone, we have more than forty thousand young men who are the sons of farmers (in the American sense,) who are the sons of mechanics—who are devoted, of whatever parentage, to the labor of a seaman's life—including also the sons of our numerous class of small traders, and including also a large number of day-laborers, not attached to any particular art or trade.

These are the young men of *our* industrial classes—these are the persons, whom the act of Congress designs to aid in obtaining a “liberal and practical education.” Of these young men, from sixteen to twenty years of age, or thereabouts, who are now working daily with their hands, it becomes us to think, when we are studying the form, and plans, and objects, of the “industrial college.” They are of divers pursuits, and therefore we are not to have a college for one object alone. They are not all to be farmers, and therefore we do not want a purely agricultural school, like Hohenheim or Cirencester; they are not all to be mechanics, and therefore we do not want instruction merely in mechanical science and art. But we want for them all, “*practical*” education, because the vast majority of them are to be practical men, and we want for them all, as “*liberal*” an education as we can reasonably give them, so as to develop their best powers, and give them as many means of usefulness, and as many sources of happiness, as we possibly can.

Look at the real case—at the positive actualities in the life and condition of these young men, as they live to-day, and as their future lives will be. The great majority of them now live in homes of actual labor. They are the sons of working men. They were bred to work, they are content to be working men, they expect to continue to be hand-workers, during at least the early part of their manhood, until, by prosperous industry, they can come to be directors of other men's labor, or until their sons shall take their work from their hands. But every one of these young men has a future—every one of them (not involved in indolence or vice) has hopeful and just aspirations to improve his condition—every one of them has an assurance, that friendly hands, on every side, will help him, if he tries to help himself, and that his efforts and his merits will be recognized by every sensible man and woman of whatever pursuit, in all the community, in every part of the State.

In our communities, from the necessity of the case, as well as under the active and generous force of our institutions, it is from

the ranks of precisely these young men, that we are to draw for almost every kind of public service, and to fill an indefinite variety of useful and honorable stations. They are hand-workers now, and most of them will continue to be so, for various periods in their future. But, in a very few years, they will also be town officers—selectmen, town treasurers, highway surveyors—they will be jurors and sheriffs and county commissioners—they will be representatives and senators—such men compose a majority of the Legislature every year, continually—some of them (by doubtful good fortune) will go to Congress. If we cannot, in the State of Maine, say that any such man, while still belonging to the industrial classes, has been made Governor of the State, yet certainly, most honorable examples of the kind have occurred elsewhere in New England. And even though they may go into no public station whatever, yet in their middle and maturer life, they will be the controlling strength and influence in every inland town. In the career of a strictly private life, every one of them has a right to expect—great numbers of them *do* expect—to attain to conditions of independent comfort and happiness. European peasants, and Southern negroes, scarcely know what is meant by a home, in its rudest form. But the son of the New England working-man, taking for his own lot, also, the life of a working-man, expects to be a “forehanded” owner, in fee, of house and land. He expects to have a wife, who will be proud of him, he expects to have sons and daughters, who will be the ornaments of his home, in his active days, and who will be his strength in his declining years.

We should not forget, because it is among the most important of the future services, to which these young men will be called, that they will always compose a large majority of the four or five thousand schoolmasters, annually employed in this State. So also, out of the number of them who are seamen in early life, we shall make—we shall be obliged to make—our shipmasters, the captains of our important coasting navigation, and the commanders of our ships in foreign trade.

Between these young men, who have such a future, and such opportunities, still belonging to the industrial classes, and that other portion of our young men, who are expecting to embark in what are called the learned professions, there needs now to be made only this comparison—that the latter are, at any given time, only a very few hundred in number—the former are more than forty thousand at all times, even after allowing for that very con-

siderable proportion, who are designing to engage in the business of merchandise.

The working young men of New England, have always had better means of education, than any similar class in the world. Their facilities for mental improvement are good, to-day. The common schools and the academies have wrought most excellent results. The simple question is, how to give them a mental training still better, more varied and more complete, so as to open for them a wider and higher usefulness, and give them the command of richer sources of happiness? and—how to do it in the most effective way? and—to touch the matter in its very sharpest point—*how to do it, so that, though educated much more completely than they now are, they shall still continue to be hand-working men—still continue to belong to the “industrial classes?”*

For, in these high northern latitudes, unless a very large majority of our people are actual hand-workers, we cannot live here. If we should educate all our young men and young women, in such manner and after such notions, that they should, thenceforth, cease to be hand workers, and think to get a genteel living by their educated wits, our entire population would be obliged to migrate into some climate, which permits a softer life, and abandon these fields and valleys, to be covered once more with forest, and occupied again by the more sensible beavers and Indians and red deer. Was *that* the design of the Providence which planted us here?

In this way of putting the case, I am touching upon a course of facts, now current and patent, before the eyes of us all. Very considerable numbers of young men and young women, obtaining here, in this State, the best education open to them, and then assuming, alas! that *because* they are educated, they are *therefore* no longer to be hand-workers, and, finding but few and scanty chances of gaining their bread by merely intellectual pursuits, in this State, are migrating annually, and seeming to themselves to be obliged to migrate to other States, for employments suited to their educated capacities. And at the same time, some wise men among us are talking, or were recently, of importing Norwegians into Maine to increase our working population!

We have come to a point in the discussion, where we stand and behold, unmistakably, the great line of distinction, that separates the ordinary literary college and university, from the proper “industrial college” contemplated by the act of Congress. The ex-

isting colleges, of the ordinary type, were never designed nor expected to educate laboring young men *as such, and with a view that they should continue to be such*, after obtaining their education. They take a great proportion of their students from pursuits of hand-labor, but, in every instance, with scarcely a possible exception to be found or heard of, they educate them *out* of their labor, fully and utterly, and with express intent so to do. Great numbers of young men have gone to the colleges from the families of farmers, and from the families of mechanics, but not one in a hundred ever went back to the farm—not one in ten thousand ever went back to the mechanic's shop. From the very nature of the case, it must be so. The whole idea of the common university and college is, and has been for hundreds of years, in Europe and America, to educate young men with a view to life in the learned professions, so called.

The sum of the matter is this—in two parts :

1. In European communities, and wherever distinctions of caste are permanently fixed, there is not, and never will be, any thorough, public provision to give superior education to the young men of the laboring classes. Scientific chairs and agricultural professorships may be established at Halle and Leipzig, at Cambridge and Oxford, in whatever number, and with whatever profusion of endowment, but they will draw no peasant from the field, no artizan from his bench.

2. In the American States, we have a thousand colleges and universities, (as we call them) and, in accordance with the genius of our institutions, and the supposed demands of a new country, they educate great numbers of young men, who come from the ranks of actual laboring life. But of all these colleges, not one has ever made provision, so to educate a laboring man, that he will, by design and of choice, continue to be a laborer; not one of them sends out a graduate, with the purpose to be an educated man and a hand-laboring man, at the same time. Nor is there any probability that the existing colleges will ever try to do this.

Is it impossible? Is it inconceivable, that, in a college of a different stamp and aim, there can be a place of discipline and training, by which American young men shall be led to choose and love a life of labor, and, at the same time, be fitted to attain to that higher usefulness and happiness, which come from superior mental culture?

That is the problem before us at this hour—a problem forced

upon us, I submit, by every fair interpretation of the act of 1862, and one, which, here in the State of Maine, with our 45,000 working young men, we ought not to leave untried any longer.

March 8, 1866.

SCIENTIFIC SCHOOLS.

Having, in two preceding papers, attempted to show what, I think, is a wide and unavoidable diversity, between the methods of public education, which are resorted to, in those communities where deep and permanent distinctions of caste exclude the actual working classes from all benefit of superior mental culture, and the methods, which *ought* to be adopted, in those of our American States, where the "industrial classes" compose the immense majority of the population, and not only hold so much power and influence, but have within their reach, so many resources of comfort and happiness, if they are taught to know their good fortune—I place, at the head of this paper, not the title "Agricultural Schools," which I found, inaptly and erroneously employed, in the article from the *New York Nation*, but the title "Scientific Schools"—for the purpose, if you will permit me to occupy your columns a little further, of showing how, and to what extent (within certain limits) the public opinion has been led away from a just observation of the distinctions I have pointed out, and how a mischievous delusion has obscured the aim of many good men, who really desired that the "industrial classes," might have the best benefits of education.

What are called in this country, and particularly in New England, "scientific schools" are, in fact, a compromise between the forms of education for the so-called learned professions, and the demand of the times for the education of practical men, for practical life. This compromise, like most others, has been somewhat at the expense of principle, and though it has effected some very good results, it has caused a great mass of notorious facts to be wholly ignored, and many great duties of the governing power, in the Free States, to be wholly neglected.

The history of this compromise is curious and instructive. For a time almost beyond history—for hundreds of years at least—universities and colleges, in Europe and America, were devoted, as repeated so many times, to the education of young men for the

learned professions—either to their general preparatory culture, or to their special training in the attached, professional schools of law, divinity and medicine, or to both. For a long, long time, the world was satisfied with this, and thought it all right and all sufficient. Within a half century past, the great and rapid advancement of the material sciences and the useful arts, particularly in this country, created a demand for a body, or class of men, who should have such training in early life, that they could carry forward those sciences and arts, to the highly important and valuable results, called for by the peculiar civilization of the age, and by the new necessities of practical life. This demand was pressed, in various forms, by practical men, upon the colleges and universities. They were the seats of learning; they were in possession of the apparatus of education; they had the public endowments; they professed to be taking care of this great public interest. It was insisted that they should do something more than they had been accustomed to, and that they should enlarge, or modify in some way, their courses of instruction, so that young men, who desired to become engineers, and architects, and naturalists, and geologists, and mining overseers, and chemists, or to devote themselves, under whatever appellation, to the higher uses of the improved practical life of the time, could obtain, within their walls and classes, the necessary general and special culture, as well as the future ministers, and lawyers, and physicians.

To my knowledge, and within my recollection, no one of the ordinary colleges in this country, ever responded to this demand, in manner and form, as made. True it is, the colleges were not insensible to the scientific progress of the times. They taught more science, and better science, and more of the principles of the practical arts, than they had done before. But only, as a part of the same continued curriculum, which embraced the training of the embryo lawyers and divines. No pressure of practical science, induced them to give up their elaborate routine of dead languages, or whatever other studies had usually been thought needful, for a career in the *learned* professions. No college, distinctively and designedly, introduced *into* its calendar, a course of study for the express purpose of preparing young men for such walks of practical life as are above stated. Precisely now, as forty years ago, the great majority of young men, who spend four years in college, are expected to be ministers, lawyers or physicians. The courses

were made for them, and are adhered to for them. *That* is the regular college course.

Within a few weeks, I have seen a newspaper advertisement of Tufts College in Massachusetts,—not now at hand—where it is stated that certain courses of study, for practical life, as distinguished from the learned professions, are introduced into the regular college course, and form an integral part of the proper college routine. I know of no other such case.* Very imperfect attempts were made some years ago, in a few colleges, to make some provision of the kind, *outside* of the regular courses, and the pupils that came into these arrangements—few enough, to be sure—were called *partial* students, or students in the *partial* course!

The public demand I have mentioned, was met in another way. The earliest response to it, that I remember, and a most laudable one, too, was the school for practical education in science and useful arts, founded by the noble-minded Stephen Van Rensselaer, about forty years ago, at Troy, New York, and long and well known by the energy and skill of its first instructor, Professor Amos Eaton. It flourishes to this day, as one of the best scientific schools in America.

One such school, of course, was not enough. Not many years later, Abbott Lawrence made his liberal donation for founding the "Scientific School" at Cambridge, which bears his name, and which has been, very nearly, the model for several others since established. But at Cambridge, at Yale College, and at Dartmouth College, these new undertakings are not brought *inside* of the regular college course, as integral parts—they remain on the *outside*, as adjunct schools, nominally attached to the colleges, which, of and by themselves, are hedged round with Latin and Greek, as of old.

This is only another way of stating the fact, obvious enough also in the nature of the case, that these establishments for training young men in practical sciences and arts, are merely profes-

*Shortly after writing these sentences, I was applied to by a young friend, whose contemplated college education had been interrupted by three or four years' service in the army, to advise him as to a place, where he might still obtain a superior general education, for practical life, without Greek and Latin or the higher mathematics, for which he now had not time. I mentioned to him the college above named, but, on obtaining a catalogue, had the regret to find, that, although a tolerably satisfactory programme was there laid down, for such general and practical education, yet the Faculty had distinctly inserted, along with it, their recommendation, that young men should not adopt that course, but rather, the full classical curriculum of dead languages and mathematics!

sional schools, adjoined to the college or university, just as, in some cases, the schools of law and divinity and medicine are. Harvard College and Yale College have them all.

The result is simply this: that we now have an enlarged variety of educated professions. Formerly we had but three—called the *learned*—now, by means of the scientific schools, we have the *scientific* professions; we have professional engineers, professional architects, professional chemists, professional geologists, professional mining engineers, &c., &c. All this is a very great and fruitful advance beyond that former barrenness, where, even in these free and intelligent States, it was not thought necessary for anybody to be an “*educated*” man, except the lawyer, the minister, and the doctor. The difference is very great. Its effect upon the aspirations of many ingenuous young men is most excellent. It has opened most honorable and useful careers to very considerable numbers of them, who had not the time or the taste to go through the courses of dead languages and other such discipline, by which only, in former times, a professional position could be gained.

It is now a very respectable thing for a college to have a “*Scientific School*” attached to it. It is thought to add to the dignity of the central institution; it gratifies the governing and managing aspirations of trustees and overseers, and is supposed to increase the importance of presidents and professors, besides adding to the patronage and custom of people who live in college towns. Hence arose, undoubtedly, that very eager, and by some thought not altogether generous rush, that was made, throughout New England, to seize the endowments granted by Congress in 1862, for the education of the “*industrial classes*.” On the showing of their hands, it was evident that these claimants had made up their minds, that the “*scientific school*,” after such models as the Lawrence, with a little agricultural chemistry and veterinary surgery superadded, would answer all the purposes of the act of Congress; and such schools, they would be most happy to “*annex*” to their respective colleges, “*provided that*” (as members of Congress say) they could also be allowed to *annex* the Congressional endowment to their college treasuries. In some cases, these claims have been consented to—in others, they have been resisted. Results are in the future.

Now it is a simple question of the interpretation of a plain statute law, whether a scientific school, such as those we have, attached

to some New England colleges, designed for the training of a very limited number of young men to be professional engineers, architects, chemists, geologists, naturalists and miners, meets that clause, which requires the endowment to be applied "in order to promote the liberal and practical education of *the industrial classes*?"

Towards an answer to this question, two or three observations may be made:

1. Congress does not undertake to provide for the education of persons, to oversee and manage, certain departments of business, in which the "industrial classes" are interested, such as road-making, and the construction of edifices, and the manufacturing of chemicals, and the working of factories and boring for oil, but it provides, explicitly, for the education of the "industrial classes" themselves.

2. It is perfectly obvious, that, here, in the State of Maine, for instance, if we should turn out from a scientific school, in a year, half a dozen professional engineers, and three or four professional architects, and two or three professional chemists, we should simply glut the market. We have not employment for half that number. They would have to starve or migrate. But the young men of this State, who belong to the "industrial classes," and who are of college age, are more than forty thousand in number.

3. Nor is this observation met by saying, that our "scientific school" would educate certain of our young men for scientific professions, who could then, in default of employment here, remove to the Western or Southern States, and find positions there, because, in the first place, we need our educated young men *here*; and secondly, because Congress has granted this endowment to every State, and therefore, there is not the opening for our young men, that the case supposes

4. Since the greatest of all industries, in Maine, is agriculture, it is a fact to be observed, that the general model of the "scientific school" as heretofore established, makes little or no provision for any instruction, which will be serviceable in practical agriculture. Yale College is inaugurating an attempted exception, which will be noticed below. I should say, it is well understood, throughout the community, that these schools are not usually designed for the education of farmers. The catalogue of the Lawrence School always places against the name of every pupil, the branch, which he is pursuing. But, in a series of years, not a name can be found,

against which appears any indication that the student ever had, or intended to have, anything to do with farming. The Rensselaer School publishes, with its annual catalogue, a list of all its graduates, showing, as far as practicable, what are, or were, their pursuits in life. Of course, there is no account of the number, who left the school without graduating. But of the actual graduates, 367 in number, I find that only sixteen are designated as "agriculturists," and these are all in the earlier years of the school—for the last eighteen or twenty years, not one. The graduates are engineers, architects, superintendents of public works, and such professions.

5. The comprehensive observation of all—as partly indicated already—is, that the common scientific school, like the common college, though it may, like the college, draw many of its students from the ranks of laboring life, returns few or none to those ranks. If it educates the young man who was a hand-worker, it educates him *out of* his labor—it does not usually so educate him that he will go back and belong to the "industrial classes." It makes of him a professional man—an honorable and a useful one, it may be—but by the very act of his education, in *that* form, he ceases to be one of the class, which the congressional endowment was designed to benefit and improve, as a class by themselves.

I cannot believe, therefore, that the "scientific school" as now in fact known in New England, answers the requisitions of the act of Congress; and although it is an admirable compromise between the old college forms and the new scientific and practical demands of this century, yet it is not a compromise, which reaches to the accomplishment of the end prescribed in the act—the liberal and practical education of the industrial classes.

To bring forward here such a matter as details of *expense*, in procuring an education, would not, of itself, control the interpretation of the statute, nor modify the essential reasons of the subject in hand. But it is well known, that the question of obtaining or not obtaining a superior education, is very often controlled and decided by the question of what it will cost. From the nature of the case, it is evident that, as a general rule, the cost of training in a scientific school, attached to a college, will be just about the same, as in the other professional schools, and just about the same, year by year, as in the college proper. It is the last, which makes the standard on the whole. Many of the college students are the sons of men of means. To a certain extent, they control the style

of living and the scale of expenditure. There are few facilities in any of the colleges, and fewer in the professional schools, for self-subsistence. College towns are apt to be expensive places, and notwithstanding their public endowments, the colleges and professional schools expect to derive an income from their students. I have before me the year's bills of a young man, who was a pupil in the scientific school at Cambridge. The amount, embracing only the established catalogue charges, and board, omitting all extras and merely personal expenses, was over five hundred and thirty dollars for the year. In some other places, it would not cost so much, but, whatever the amount, it is, as we say, *all cash*, and is a burden, which only a very few of *our* young men can bear.

To the scientific school of Yale College, there was added last year a "Course of Agriculture"—two courses in fact, a full course and a shorter course. The full course is three years, and the charges, in the school bills alone, are stated to be about one hundred and seventy-five dollars a year. Add the cost of board, in a town like New Haven, and the result is an expense, such as could be borne only by a few of our young men. The shorter course differs from this, as to cost only, in leaving out one term in each year.

The experiment at Yale College is an interesting one, and, if good results can be obtained anywhere in this country, by attaching a course of agricultural instruction to an attached scientific school, in a college town, without a farm, and without practical discipline in the field, they may be expected to be reached there. But however successful the experiment may be, with the few students, with whom it is possible to bear such expenditure, the question will still remain, demanding its answer, What is to be done for the thirty or forty thousand young men in Maine who stay at home, and who must stay there, until methods of education are provided, suited to their present and expected condition in life, and within their means to obtain?

March 19th, 1866.

AGRICULTURAL SCHOOLS—No. 4.

The College for the Industrial Classes—What should be Taught?

If then, the attempt ought to be made, to offer to the young men of our large and constant class of hand-workers, such man-

ner of education, as that, while abiding, through their early manhood, in the ranks and pursuits of actual labor, they shall also command, for their life time, the happiness and the usefulness of superior mental culture, it is impossible not to see that we meet here, unavoidably, the next great question in the case,—What course of study and discipline is most likely to answer their specific necessities? This question, it is plain, lies at the very foundation of the matter, side by side with that first problem—*Who are to be taught?*

No one ought to attempt a complete answer to this question, until after some honest and wise experience has been gained in this now untried field of effort. And I hold, without hesitation, that the best persons to devise the particular plans of study and discipline for such pupils, in such a college, are the very persons, who are to work out and execute the actual details of the daily life of the institution. If the managing overseers of such a college, at the very outset, after determining to aim at some such object as I have brought to view, were then asking for some one to help them, about plans and subjects of study, and methods of internal policy and discipline, I know not what better advice could be given, than simply this: First of all, find the men who are to administer the internal life of the college,—make sure that they are the right men, sound and clear upon the essential principles of the business in hand—men, who heartily desire, and fully believe in, the personal union of skilful head-work, and skilful hand-work, and let *them* devise the courses of study and discipline, which they themselves are to carry out. So I trust, there would be less danger of slipping into the ruts of old routine, and the pernicious facility of doing as other people do.

Waiving, therefore, all pretension of laying down any scheme of particular studies—some of the departments, also, being quite beyond any province of mine to advise about—I venture, nevertheless, upon a few general suggestions, as to some parts of the educating influences and means of influence, which I hope such a college may exert upon our working young men of New England—attempting, at the same time, to show how plainly and distinctly the act of Congress sustains the views I have advanced.

1. We must bear in mind the element of *time*, as affecting and controlling to some extent, the study and the life of the college. The seven or eight years required for such education as is obtained by the graduates of the other colleges, is wholly out of the ques-

tion here. The young men could not submit to it, and there is no reason in the world why they should.

2. Since the Industrial Colleges are founded upon a public endowment, faithful recurrence is necessary to the specific terms employed in the act of Congress, so that we may observe both the range and the limits of the training contemplated. Congress has not established merely "agricultural schools," and nothing more, nor mere schools for instruction in principles of mechanic arts. Reflecting persons ought to be on their guard against settling down into the habit of calling the institution "the Agricultural College," lest, by the mere force of a name, they should come to think that it is designed only for farmers, and will teach nothing but agricultural science and art.

It will be seen, also, that in the corps of instructors and directors, there are to be other faculties besides those of teaching agriculture and mechanics. General education is specifically provided for, as well as training in the rules and methods of practical working life.

3. The act of Congress is very plain. It declares that in the college thus endowed "the leading object shall be * * * * to teach such branches of learning as are related to agriculture and the mechanic arts." Evidently, therefore, students who are intending to engage in mechanical pursuits, must be provided for in the course of theoretical study, as completely as those who are to be farmers, although, from the nature of the case, there cannot be an equally full opportunity for practical demonstrations and applications of what is taught. Conceding then, as we must, that the future mechanics and the future farmers are alike within the provisions of the act, I now recur to one of the clauses omitted in the above extract, which, although it is negative in form, I understand to be full of affirmative meaning and direction. The clause is—"without excluding other scientific and classical studies." It is hardly necessary to remark here, that the term "classical" is not to be taken in the narrow sense, that would confine it to the study of Greek and Latin. It is plainly a broader term, as here used. Precisely as the adjoining word "scientific," may include natural science, or metaphysical, or political, or ethical, or some other kinds, and it is left to the judgment of those in charge to determine which, and how much, of these scientific studies may be undertaken, so, out of all that other group of literary studies, which pertain to what has commonly been called a classical educa-

tion,—in which our mother English is most surely entitled to a place—it is provided that those, who plan and administer the courses of study, may select and teach such parts as they find practicable and servicable for their pupils. All this I take to be equivalent to an affirmative declaration by the act, that, while the leading object is to train young men to be farmers and mechanics, they are also to receive as good a general education, and as comprehensive a culture as is reasonably practicable, within the means at command, and the time, which these classes of young men can devote to early, formal education. Thus it will result, that the young man, who has gone well through these courses, will not only be able to say to himself, with just and honorable satisfaction, “I am now well trained to be a farmer;” or, “I am now educated to be a mechanic,” but also, and in both cases, “*I am now an educated man,*” and not only say so, but prove it, by his life.

This view of the problem before us, cannot be too carefully and deeply considered. We shall belittle and enfeeble the whole enterprise, if we suffer it to settle down into mere specialities of farming and mechanics. There is no need of it, at all. If the students are wisely directed, they can gain most excellent proficiency in the elemental principles of those pursuits, and in much of the practice, and, at the same time, can acquire a good general education—one that will put them, intellectually, on an equal footing, at least, with the majority of our professional men, and one which, dignified, as it may be, by the manifestation of thorough skill in practical arts, and by the energy of a useful practical life, will secure to them respectful appreciation by the most cultivated persons in society.

And I cannot doubt that the act of Congress intended to indicate just such a result, in its declaration, that such and such things are prescribed, “*in order to promote the liberal and practical education of the industrial classes.*” The term “*liberal*” appears to be employed, as if with design, to show that general culture, intellectual development, and some degree of literary refinement, are to be aimed at, as well as proficiency in useful arts of hand-labor.

4. Having spoken so distinctively in the preceding paragraphs, of farmers and mechanics, I wish not to be understood as leaving out of view that very large class of young men in Maine, who are more or less devoted to a seafaring life. Sailors are not usually

called mechanics, but it is evident, that much of their art rests upon those mathematical truths, which are the foundation of so great a part of mechanical teaching, and that, in plying their trade, they are constantly dealing with machines, which involve scientific principles, and which they will use in the best manner, when they are trained to the best understanding of them. For them, therefore, the college will furnish a large part of the elemental training so necessary for their highest usefulness, and for their best personal improvement. Of course, I am not now referring to that class of seamen, gathered out of the seaports of all the world, whose only life is from the boarding-house to the ship, and from the ship, back again—from whom nothing is expected but manual dexterity and unthinking obedience—the “old salts,” whose career, begun by accident or necessity, is pursued without aspiration, and without hope or thought of self-improvement or independence. But I am referring to the native-born, young sailors of Maine, whose actual homes are here, on all our hundreds of bays and rivers, so many of whom enter upon that career, with definite purpose and expectation to improve their condition—great numbers of them becoming, as we know, commanders of vessels—and for whom a sensible, skillful, and systematic education in early life, with the influences of a New England home to help, will tend to make them, when they reach the quarter deck, not only thorough seamen, but also well educated men. And such an opportunity for their early training seems to be the more desirable, because so many of the sailors of Maine lead a double life. It is very common for them to be both farmers and sailors, and the college will open to them means of improvement in both capacities.

5. I cannot form, and have never attempted to form, any idea of the institution, which does not include, in a large and controlling degree, the essential feature of a common *home* for all its inmates—teachers or directors and students—where the sympathies and intimacies will be far closer than they are in the ordinary college or university. If I supposed that teachers and students were to live altogether apart, save only as called together, twice or thrice a day, by tap of bell, for formal recitations, I should abandon all hope of any results worthy of the labor and cost of the enterprise. But since the design seems to be, to make the training of the college bear directly upon actual life, and since the handling of practical subjects, by practical demonstrations, is to form so large a part of the discipline, and the students, coming from homes of actual labor,

are to be trained and educated as and for laboring men—and so ought not to intermit labor altogether, while in their training—and are to go from the college, into a life of just such labor as has formed a part of their education, it seems probable that teachers and students will be brought into near and frequent intimacies.

And I suppose it scarcely possible, in this age of the world, that any instructor in such a practical college, will fail to see the indispensableness of teaching by the observation of facts and things, as well as by the theories and statements of books. The laws of nature will be shown by the facts of nature, and by natural objects. Students must be taught about these things, in the open world of nature. Teachers and students together, must see and handle the actual things, which are the subjects of instruction—plants, and rocks, and soils, and fruits, and crops, and machines and apparatus, and horses and cattle. In a word, the life of the college, and the instruction of the college, will be, to a large extent, one and the same thing.

I should count it, therefore, as one of the most beneficent and fruitful influences of the college, that these young men, with but limited opportunities, before, for intellectual culture, would be brought into so direct and constant intimacy with the cultivated men, who compose the corps of instructors. From these men, as models of learning and manners, so often and familiarly with them and among them, they will receive refining and liberalizing influences, quite beyond the effect of the formal hearing of lessons in the class room. It is impossible to over-estimate the value of *learning by models*, where these models are high-minded, sensible, well-behaved, cultivated men,—sympathizing, affable, generous and kind.

6. I should hope that, foremost among the means employed in the colleges, to wake up the minds of the working young men, would be a large and good library. I do not refer now to the apparatus of scientific books; I mean a library of all kinds of good books, in their mother tongue, which would amuse, entertain, enlighten and instruct these students, by the knowledge of a thousand things, not before open to them, serving to excite their curiosity, and to create an appetite for intellectual improvement. Many a young man would wake up in such a library, who was never intellectually awake before, and, once aroused, his mind would never go to sleep again. Experience would show too, most interesting examples of young persons, who, though they never saw but few

books before, had, in reality, a keen zest for the delight of reading, and whose introduction to such a library, would open to them a world of wonder and pleasure. Such a library should be so large and so good, that the students should see and feel it to be a most prominent and important part of the institution. And I know of no better way of placing and using such a library, in such a college, than simply this—to put it in the most central and conveniently accessible part of the whole establishment, with its doors never locked, and with the fullest liberty and encouragement to every student, to resort to it, at any hour of day or evening, when free from prescribed duties elsewhere, and read at his pleasure, only under such advice as a judicious superior would give, in the way of helping and not of hindering, and—subject to such advice—absolutely without any other restriction, than that his hands should be clean. If, in resorting to and enjoying such a library, the student should, there, also frequently meet his instructors, engaged like himself, in making intellectual research, or seeking intellectual entertainment, this would be another sympathy of their common life, and would draw the pupil into still nearer, pleasant and courteous intimacy with his cultivated superiors.

7. As an attainment specially desirable for these young men, I should reckon a thorough training in the knowledge and use of their mother tongue, and a liberal acquaintance with the lessons of truth and wisdom contained in its literature. Other languages may, perhaps, also be taught, for the sake of scientific enlightenment, but as a resource of general culture, and as an instrument of an educated man's power, a good mastery of the English language, would be, to all these young men, a discipline of primary importance. I do not refer to the mere technicalities of linguistic study. I should hope the persons in charge would not yield to the detestable and accursed superstition of teaching the grammatical science of a language, instead of teaching the language itself. To our young men, already trained by school and home influence, to a comparatively accurate use of their native language, it may well be further taught by its models, rather than by its rules. These models, skilfully and abundantly placed before them, not only in books of classical English, but in the refined speech and style of their instructors, to whom they listen, and with whom they converse in the daily and hourly intimacies of their common life, will unavoidably tend to form, in them also, the habit of speaking and writing, in their mother tongue, with accuracy, readiness and force.

Direct instruction, of course, will not be omitted, but that may well be, upon the actual and practical use of the language itself, and not, mere drill upon its forms.

How important it is, that our working young men should be trained to this faculty of speaking well and writing well, in their own language, cannot fail to be observed, when we see how often, in common life, and how unfortunately, this distinction has to be drawn, between our practical men, and those who are called the educated men of the community—that one class has the command of language, the other has not. The practical men are not, unfrequently, the complete equals of the other class, in good sense, in the understanding of the subject matter, and in devotion to the object in hand,—often, are really superior in these particulars—but they are compelled to be silent, while an unjust, and sometimes unprofitable prominence has to be given to the few, who have been educated to the faculty of speaking or writing, on public occasions. In a thousand instances of constant occurrence, the practical men, the working men, are obliged to ask of the educated men—the lawyers, the ministers, or some other such person—to prepare for them written statements, reports, and documents, or to make addresses and speeches, because, as a result of our usual method of education, these latter commonly have, or are supposed to have, a superior faculty for such purposes. This inferior and subservient position of the practical men is wholly needless, if only, they can have that “liberal and practical education,” which the act of Congress intends to give to the “industrial classes.” Of course, to speak well, or to write well, one must also have the faculty of thinking sensibly and reasoning justly—and this faculty, no intelligent educator of our working young men, will fail to train and develope—but it is just as certain, that a diligent, well-disposed and ambitious student of an industrial college, can be taught to speak well and write well in his mother tongue, as it is that he can be taught to swim or to skate. Not that our young men should be trained into a foolish and vain habit of making speeches for pride and show. I only urge that they should be so educated, that they will be able to speak or write, with acceptance and conviction, whenever a just duty to themselves or others may reasonably require it.

8. In my citation of the terms of the Act, I omitted the clause, “including military tactics.” This is affirmative and directory, and indicates that Congress thought such instruction to be not

only desirable and important, but practicable also. Undoubtedly, by a careful distribution and economy of time, the students can be made familiar with the manual of arms, and the evolutions of small bodies of men. If suitable instructors are to be obtained, they can also be taught a good deal of the general principles of the military art, and of the history of warfare, especially as illustrating the history of their own country, and as inculcating, withal, the greatest lesson of war, a true love of peace. But without attempting here to go into any particulars of this part of the instruction, I submit, that under this provision of the Act, a most excellent general influence might be exerted, over and through the whole institution, by the enforcement of habits of order, and habits of obedience to regulated authority. Not, by any means, that all the discipline should be of military strictness, but that, throughout the whole life of the college, and affecting all its members, officers as well as students, it should be as well settled, as in the "tactics" of a camp or a garrison, that there is to be no disorder, no confusion, no recklessness, and no permitted disregard of reasonable regulations. To teach a young man the manual of arms, and yet allow him to be a sloven in his personal habits, to require him to observe the word of military command, and yet be contemptuous of all other lawful authority, would be simply nonsense, and the most unthinking student would feel it to be so. A proper observance, therefore, of this clause of the Act, would tend to make the young men orderly, neat, and justly deferential to wholesome rules of personal conduct. How important these habits would be to them in after life, in plying their vocations, in managing their property, and in training their children, needs no argument.

And not least important, I should suppose, among the effects of this clause of the Act, upon the whole internal policy of the institution, would be the observance of that indispensable part of military arrangement, *frequent and rigorous* INSPECTION. Not mere espionage of the students—not mere examination of their dress or their arms, when drawn up in line—but comprehensive, systematic, regular and peremptory inspection of every body and every thing belonging to the institution—from the highest officer and the most prominent service, down to the lower details of the farm and the workshop. By such means, all would cultivate an eye for order, and a sense of propriety and fitness. And one great object of such inspection is, to reach the conduct and conscience of superiors as well as of subordinates. The highest must bear inspec-

tion as well as the humblest, and where this discipline is faithfully applied, it sometimes happens, that, although a subordinate may be immediately and actually in fault, yet it is the superior, who is justly cashiered, for allowing indifference and neglect of regulations.

This method of management is not common in colleges, any more than it is on railroads. But there are few departments of human affairs, where it would work better.

There is but one thing in the Act of Congress, which I regret—and that is, that the Act employs the term "*college*" to designate the institution contemplated. The danger is, that the *name* will suggest and encourage pernicious imitation of old and inapplicable forms, and methods, and habits. One of the hardest things to be done, in the course and management of human affairs, is to *keep the wheels out of old ruts*.

April 23, 1866.

THE INDUSTRIAL COLLEGE—No. 5.

Questions of Cost.

The question of the cost of educating the young men of the "industrial classes," is one, which lies as near the foundation of the subject as any other, and is, if possible, more indispensable to be met, than all others.

To attempt to manage this question by the mere dullness of imitation, and leave these young men to pay their bills, as young men do in other colleges, is a simple dodging of the whole case, and will be fatal to any of the colleges, that shall slip into that rut.

A cash expenditure, to pay college bills and board, of from three or four hundred to six or eight hundred dollars a year, is a simple impossibility, when the question concerns the mass of working young men, in this part of the world.

The whole question is in two parts—the cost and character of the public structures, fixtures and apparatus of the institution, and the private expenditure to be borne by the individual student. By unfortunate arrangements about the first branch of expenditure, the second may be deeply affected. Pretentious buildings may give pretentiousness to the whole establishment and to all its life, and may force out of practice, and out of view, that pure simplicity, which is the warp and woof of all true economy. How far

and how wisely the dangers of this part of the question will be avoided, in these new establishments, a few years' time will disclose. All experience shows how great is the chance of mistakes under this head. The managing authorities of such public institutions are regularly victimized, in a great many cases—sometimes by themselves, through the obsequiousness of doing as other people do, or the ambition to make a special show of their own—sometimes by the partisanship of local dignitaries, who wish for buildings that will glorify the neighborhood—sometimes (and that too often) by architects, who wish rather to display themselves, than to do the true duty of their art, and, not unfrequently, by actual builders, who think it not their business to be troubled about cost, if the bills are paid, somehow or other.

Restricted, as the colleges are, by the act of Congress, rigorously and wisely, from spending any part of the endowment upon buildings, if the managers of the institutions lavish the means they obtain from other sources upon ostentatious edifices, and fixtures, they will thereby, in the majority of instances, convert themselves into public beggars. And as these institutions may not, for some time to come, command the favor of the present influential classes, such beggary will be as hard, as it will be degrading.

In such a position towards the public, the institution can hardly be attractive to its expected inmates, or in a condition to impress upon its students, that form and force of independence, which, next after simplicity, is the best element of economy, and among the best influences that promote a useful and cheerful life.

To the students, the college will be a place of home-life for some of their best years; to the officers and teachers, it may be a permanent dwelling-place. And for both of them, therefore, the utmost care is required, that no architectural caprices impose upon them, a life of discomfort. He needs to be a wise and cautious man, who builds houses, in which *other* people, not criminals, are to be *forced* to live.

The strictest regard to the fitness of things—the adaptation of forms to purposes, and of means to ends, will be the best rule of architecture and the best rule of finance, for the colleges now contemplated—original and peculiar, in their character, as they are—having, as their sole design, to do what never was attempted before, in all the tide of time, on such a scale,—“to promote the liberal and practical education” of the young men, who belong to

the working classes, and, who are to continue to belong to them, after they are educated.

It is assumed, of course, that there is to be a domain of tillage, grass-land, pasturage and forest, with buildings for the crops and the domestic animals, and workshops and laboratories to some practicable extent. If any persons assume, that the students are to be housed in dormitory buildings, with separate rooms, as in the old colleges, a difficulty of the most serious nature presents itself, in the charge of such buildings upon the common funds, and the rent, which, on such a plan, would have to be exacted from the students. It might be interesting to anticipate, how, after some period of experience and prosperity, it would be practicable to afford larger accommodations, but in the first experiments, with very narrow means, it is far safer and easier, to go upon the plan of large common rooms—one or more, as the case might require—for study and for social life. This would comport with the idea of household arrangements. So also, large common chambers for lodging. Such arrangements are perfectly practicable. It is not necessary to think of the fore-castle of a ship, or the barracks of a garrison. These may be places of confusion, ill-manners and discomfort. The wards of a well-managed hospital give an example of another kind, where, by thorough regulation and discipline, the utmost order and neatness are secured. The pupils of the Girard College—some years ago, at least—all slept in large common rooms—each one, with a separate bed. The same kind of arrangement, I have been told, is strictly maintained at the Friends' Boarding School in Rhode Island. Both these institutions are affluent in resources, but they have not thought it necessary to impose upon their funds or their students, the cost of separate dormitory buildings and rooms,—which, besides their cost, have the pernicious effect of obliterating all idea of household, or domestic life.

How are the students to be subsisted?

Our own legislative act for the industrial college, contemplates that the *tuition* is to be, without charge to the student. But in all colleges, the charge for tuition is very light, compared with the cost of subsistence. This is the great difficulty and barrier, which has shut out vast numbers of young persons, of both sexes, from such institutions of learning as we now have. Oftentimes, a father, or a widowed mother would gladly have paid the twenty or thirty dollars, or twice or thrice these sums for the instruction of their children—but the moment that *home* is to be left, comes up the

question of subsistence, in another town, in another family. A cost of one hundred, two hundred, three hundred dollars a year—*all cash*—credit is impossible—this is not a difficulty,—it is an absolute bar against entrance to the places of education, for thousands and tens of thousands of every generation, here, in our own State.

Is this a necessity? Is there no ingenuity or pains-taking, that can devise a better way?

Assuming that the site of the college is to be a farm of adequate extent, of at least average fertility, reasonably divided into plough-land, meadow, pasturage, forest, and orchard ground—assuming also that the sons of “the industrial classes” can be provided, by themselves, or by their friends, with books and clothing and bedding, and with means to defray the cost of washing and the other small personal expenses—I propose, without hesitation for myself, but with due deference to all better judgments, as a solution of the problem of subsistence, that the students be trained to produce their own food, or, as much of it as may be practicable, and, if practicable, a sufficient surplus to pay for the cost of cooking it.

Such production of their own food, by the students, would, of course, include the raising of forage crops for the requisite number of domestic animals.

Be it observed, that I do not use the word “*earn*,” but the word “*produce*.” To earn a subsistence is one thing; to produce it is another. Manual labor schools of the old pattern, were places, where the pupils undertook to pay their bills, by *earning money*,—usually, by workshop labor. But that involved dependence upon markets. The student had to *sell* the product of his labor, and was therefore exposed to the chances of merchandising. Usually, he could make but a limited variety of fabrics, and these might be what the market did not want. Unable to sell his products, he was forced to omit his work, and, being idle, could not pay his bills. Sometimes it was arranged, that the institution gave the student credit for his work, and took upon itself, the sale of his wares. But that soon made a bad matter worse. As a general fact, such plans wholly failed.

But in the industrial college, with productive farm lands, there are means to solve the problem, or to *try* to solve it, in another way. If the student can produce enough wheat and Indian corn, for his own bread, and enough more to pay toll to the miller, and wages to the cook, it will be as wholesome as if raised by other

men's labor, and loaded with other men's profits, and it will be the bread of independence, which he can eat with thankfulness, while enjoying the means, which the college affords, for his scientific enlightenment and literary culture.

Precisely here will come in, the ready objection of those, who doubt, if they do not condemn, the idea of the industrial college. "Students," they will say in the first place, "are persons, whose business is, to study, not to work at hand-work"; and, secondly, "there is not *time* enough for proper study, and for the amount of hand-labor, that you propose." The first part of the objection goes merely upon old habit and routine, and therefore may be dismissed without answer. As to the second, can any one inform us, how much time is usually spent by college students, in actual study, and how much, in that, which is neither study nor productive work? Will any one make the investigation, and give us the real figures? What is the meaning of the present fashion to have a gymnasium at every college, and why is the humblest college in New England now looking round for a benefactor (?) to make them a present of a gymnastic building and apparatus? Why do the officers and friends of the colleges encourage Ball Clubs, and Boat Clubs, and contests and races, as a part of college life? What are all these, but physical labor, and very hard labor, too?

The answer is obvious. The world is coming to find out again, what was well known to the best part of the world, thousands of years ago, but was buried for some centuries, in the cells and cloisters of monasteries—out of which the modern universities and colleges grew, by imitation—that the mind is best developed, best disciplined and best refined, where there is an even, thoroughly sustained balance of bodily vigor, and an equal exercise of the physical powers. The body and the mind, so far as the present question is concerned, are the man. These two parts of his being were made for each other. To balance them rightly, to make each one of them serve the highest uses of the other, is the highest duty that the man owes to himself, and the most fruitful cause of his mere individual enjoyment. There are the moral faculties, it is true, but if any one thinks that these, also, do not indispensably demand the equilibrium of physical vigor, let him read the history of the disease called *hypocondriasis*, for information.

Ample sufficient medical authority declares, that much more than the usual measure of actual muscular exercise should be practised by students and persons of sedentary pursuits, and that too, in the

open air. Dr. Hubbard, of our own State, says: "Of the whole amount of time devoted both to study and to physical exercise, a full half should be given to the latter."

This topic is a most fruitful one, but it cannot be further pursued here. Only, let it be set down, that they, who maintain the truth of this proposition, do not admit, that, by such practice, there will be any diminution of good results of intellectual labor. On the contrary, they hold, that, with an even half of time given to bodily labor, the intellectual results will be actually larger, clearer, more original, spirited, sensible, effective and better in every way.

Regarding, therefore, the extent of the field of study, which the students of the industrial college, will usually attempt to go over, regarding also, the facility with which, by the conditions of the case, they will distribute their time between study and labor—it being the fundamental order of their life, that it is to be a life of both combined, and all things being arranged agreeably thereto—considering also, the amount of labor usually performed on New England farms, to the extent of procuring subsistence only, I see not what need there is for hesitation upon the question, whether or not these young men, under skilful leadership, and with a view to an honorable independence, can produce their own food, during their student-life! If the way is ever opened for the trial, I believe they will show that they can do it, and still achieve the most creditable intellectual attainment, with ample time for recreation and sport, besides.

To attempt here, to go into particular statements of *how* this thing can be done, might be only to imagine the details of an untried experiment. The treatment of such practical details, is not now of so much consequence, as it is, to secure attention to the *reasons* of the thing. It is precisely one of the cases, where it is well to spend some time upon ideas and principles, postponing the verification of them by facts, until we have tried to get at the essential logic, which lies under all facts. But there are several considerations, which may be briefly stated, as aids to reflection, upon the general case.

1. It is a prevalent custom, with most New England colleges, to have a long vacation in winter, chiefly for the purpose of enabling some of the students to spend that time, and a portion of the adjoining terms—two to four months or more—in school-keeping—that is, in *labor*, so that they may earn money to pay their college bills, the heaviest of which, is the board bill. School-keep-

ing is the only kind of productive labor, which is open to the student of the ordinary college. Here is a pregnant concession, that a young man may obtain a fair college education, and graduate with credit, notwithstanding that he takes out, absolutely, from his college life, one sixth to one third or more, of every college year, and spends it in labor. Be it observed, also, that it is the *poor* students, who do this—rarely, the gentlemen's sons—and the college systems are not without fault, that keep up such distinctions. School-keeping, it is true, has some advantages, besides the money it yields, but they are advantages that are heavily, and often unseasonably, won by young men, at *that* stage of their career. But, in the arrangements of the industrial college, why not, instead of sending the student *away* from his education, to *earn money*, to pay his board—why not let him remain, at the college, as a pleasant home, with its social and intellectual influences, producing his subsistence, then and there, by healthful labor, during some reasonable hours of every day, and save his vacation time, for its proper use?

2. In this latitude, all agricultural labor in the field, is comprised, very nearly, within the six months from the first of May to the first of November. In that half of the year, the hundreds of thousands of New England farmers, do all the field work, by which they subsist their families. For the students of the industrial college, there remains the full half year from November to May, within which, all requisite time could be obtained for that study, which, it may be supposed, should be solid and continuous, with hardly any greater amount of *indispensable* hand-labor, than what is performed by farmers' sons, who attend the winter school. Nor is it necessary to imagine that this student-life is to be six months labor, and six months study. That would be unwise and unacceptable. In the pressure of seed-time, and the pressure of harvest, some whole days might be required for continuous field-work,—although even then, as at all other seasons, it would be practicable to conduct the labor by such a system of relays, divisions and classes, that no student would be obliged to spend the whole of even a single day in the field. By the case supposed, these students are the subjects of military drill. There would be no mark or sign of military management in this field labor, but there would be the influences of order, regularity, promptitude, and the advantage of every one knowing his place. But, certainly, except at seed time and at harvest, with well disposed and well managed

young men, few days would need to be passed, in the growing season, without a share of time for study and lectures and recitations—it being observed, that for the pupils who study agriculture, specifically, a considerable part of the instruction itself will be in the field. In the winter half year, it might even be more difficult, in our latitude, to get the due amount of labor, than the due share of time for study. But there would be, the preparation of fuel, the care of the domestic animals, the fabrication and repair of implements, and all that part of the household management, not attended to by hired servants.

3. Agricultural labor, everywhere, requires, before all things else, an adequate number of *hands*. It is a hard fact in the ordinary farmer's life, that he has to work so much *alone*, or to pay wages, which exhaust his returns. But here is to be a collection of sound and vigorous workers—young men—boys, it may be, some of them—but so *many*, that if—as must always be understood—they are well directed, they can go over scores of acres, where the single-handed farmer, hardly gets over one. Well furnished with implements and animals, they could gather the whole hay crop in three days of sunshine. Whether in the infancy of the industrial college, in its days of experiment and struggle, it could afford a full equipment of labor-saving and *time-saving* machinery, may be uncertain. But the economy of many hands, would be an established fact, in the case, at any rate.

In due time, no doubt, they would have the aid of the improved agricultural machinery, by which so vast a difference is made between field work now, and what it used to be; and these young men would thus be masters of the situation, and would be at no loss to find time for intellectual pursuits, nearly every day, in the intervals of the light and rapid labor, performed with the aid of such machines.

4. It would, probably, follow, as a necessary arrangement, where there is a collective subsistence out of a common stock, that some rules of uniformity, such as the principle of the ration, and the principle of the mess, should be observed, with more or less strictness—an arrangement, also, of commissaries and stewards—in which capacities, the students themselves should be trained,—all which methods, would tend to promote economy, effectiveness and contentment.

5. It is not to be assumed, that the food department would be like the arrangements of a hotel, or of a six or seven dollar board-

ing-house. As a matter of course, the food of the students must be plain, but there is no reason why it should not be perfectly good, wholesome and palatable, and well cured and well cooked. As to quality, it would be very much within their own control. They would soon learn—what so many are ignorant of—that it does not require any more labor—if only a skilful intelligence directs the work—to produce a good material for food, than it does to produce the inferior. Nor would their table need to be without some luxuries. What hindrance would there be in the way of supplying such a commissariat, with choice fruits of the garden and the orchard, without any money cost, after the trees, and fruit-bearing shrubs and plants are once procured, and begin to yield?

6. Such a system would, of course, require a stock of provisions, or some kind of subsistence fund to begin with—an object, which might be attained in various ways. One method might be, an advance of a certain sum of money, by every student on entering, to cover the first several weeks. But the advantages of simplicity and ultimate uniformity would justify the attempt to provide this preliminary resource, out of some general fund or means.

The casualty of unfavorable years would have to be considered in all calculations. If it should be found practicable, in an average season, to produce *enough*, reasonable effort and skill would take advantage of all favoring opportunities to produce something more. And since some of the food-crops cannot be kept over, surpluses of that kind, would, naturally be disposed of, for money or its equivalent, thus laying the foundation for a subsistence fund. Specific and distinct accounts of such a fund would require to be kept, with rigorous care, and the whole gains reserved for the necessities of unfavorable years. If it is worth while to imagine that this fund might become unduly large, it is equally easy to anticipate methods, by which it might be restored to a proper measure.

7. No such result as the self subsistence of the students of an industrial college can, by any possibility, be accomplished, without a peculiar degree of administrative ability in the governing power of the college. Every other kind of ability, every other form of learning and culture, every other shape of official authority and dignity, would be useless, to *this* end, without a special and superior executive aptitude, inventiveness, firmness and per-

severance. If, under such direction, the experiment should succeed, how great would be the influence of such faculties and forces, in shaping the habits and developing the resources of ingenuous young men! Such influences would not only help them to procure their bread, for the time, but would be like wells of water, nourishing all their future lives.

One or two explanatory statements may be advisable, to guard against misunderstanding.

1. The productive agricultural labor, of which I have been treating, belongs to the economics of the industrial college—not to the department of scientific instruction. The experimental work upon the land, for the purpose of discovering the scientific laws of production, and the best application of scientific principles to practice, is another matter. That is a business of instruction, and belongs to the same department with text-books and lectures and recitations. Scientific experiments upon land often produce nothing but scientific truths, or merely expose theoretical errors. And yet, I suppose, that a young man, working one part of the day, in one field, to produce a crop for his own subsistence, and watching and studying at another hour, in another plat, the progress and details of a scientific experiment, from which he might hope to learn how to produce the same crop, the next year, with less labor, or with richer yield, would find his two pursuits agreeably blending together, and each adding interest and satisfaction to the other.

2. I have not forgotten, that the students of the industrial college, are not all to be farmers. Mechanics also, and persons of other industries, besides agriculture, are to be educated. The purely scientific study of cultivation, whether in the class-room, or in the field, is the business only of that part of the students, who are devoting themselves to agricultural life. But the young mechanics, and the young sailors, must have their food, while getting their education, as well as the young farmer. One of them is quite as likely to be without cash means to pay for his board, as the other, and all of them, will have equal intervals of time, not requiring to be occupied in mere study. All will be members, also, in the same household arrangements, and share together, in a common social life, during their career of education. The problem, therefore, of self-subsistence, is the same for all of them, and I see no reason, why they should not work it out together. Working together for their food, they will divide, in their study hours,

into their several departments, and courses of scientific enlightenment, yet coming together, again, constantly, in those general studies, which tend to promote the liberal culture of all of them alike.

Nor can I see, that any one of them, whatever his ultimate pursuit, will have suffered any loss, by devoting such a part of his college life, to the cultivation of the ground. They will have settled their habits of industry, they will the more surely have gained the all-important knowledge of the value of productive labor, they will have learned, it is to be hoped, the vast difference between labor, which is skilful, and that which is mere drudgery, and, if successful, they will have won the life-long satisfaction of independence and self-respect.

In the rapidly shifting forms and fortunes of life, in communities like ours, and in a new country, where every possible industry is in demand, and where individual or social needs induce constant changes of pursuit, and require so many combinations of faculties, it never can be an injury or a loss to a mechanic, that, in his early life, he had some good, practical training in agriculture.

The proposition may be stated in far wider and bolder terms. Among all the multitudes of men, not devoted to agriculture, there does not live upon the face of the earth, a single man, physically sound, from kings and emperors, down to the lazzaroni in the gutters, to whom it would not have been an advantage, if, at some time in his life, he had practised the art of producing his own bread, out of the earth, by the labor of his own hands.

P. BARNES.

Portland, Dec. 6, 1866.

Until very recently, a confident expectation has been entertained of being able to present here a report of the progress of the State College of Agriculture and the Mechanic Arts from the pen of the President of the Board of its Trustees.

Although circumstances prevent its completion in time to appear in these pages, such a report may yet be expected during the early part of the session of the Legislature, and such being the case, there appears an obvious impropriety in any attempt on my part to anticipate its statements, views and recommendations.

No one who has followed the very able writer of the next preceding article in his presentation of the subject, can fail to perceive in some good degree, the novelty, the magnitude and the difficulty of the problem, the working out of which is put in charge of this Board of Trustees. To those who are impatient of delay, and desire speedy results, we respectfully suggest that the class of institutions called into existence by the act of Congress is wholly unique, that there are no precedents by which to be instructed, and that great danger exists of falling into errors more or less injurious; consequently it is the part of wisdom to exercise great caution and deliberation in the adoption of the means to be used to carry out the trust.

I will merely remark that in the early part of the past year the location at Orono, in Penobscot county, was decided upon, and that progress has been made on other points connected with the establishment of the Institution.

The operations of the County Agricultural Societies during the present year, have exhibited considerably more of energy and activity than was manifested during some years previous. This was naturally to be expected, for during the four or five preceding years the attention of all was so deeply engrossed by the tremendous struggle for self-preservation and liberty through which our beloved country was passing, so much of anxious thought and care was compelled to be given to matters related thereto, so much of sacrifice in varied forms was imperatively called for, that whatever else could, for the moment, be laid aside, must needs give place to the urgent demands of the hour.

Those years, however, have left a deep and broad mark upon agricultural progress in Maine. The necessity of obtaining food

for man and beast and means to meet the numberless calls, and this too with a diminished expenditure of human labor, led to the introduction and extensive employment of time-saving and labor-saving implements and machinery, and to greater skill in the numerous operations of husbandry.

Especially may the influence of these years be seen in the rapid extension and increase of sheep husbandry, and in the improvement of breeds of this invaluable domestic animal. This extension and improvement received great encouragement from the probability, and I may say, confident expectation, that the national requirements for revenue would insure a tariff upon wool which would yield a steady and sufficient protection to the home grower, so as to enable him to compete with production in those more favored foreign countries where neither shelter nor harvesting and housing of food for half the year are required. I regret to learn that doubts are entertained whether such a tariff may be adopted; and this not merely because the failure to secure a protective duty upon foreign wool would result in the sinking of a large amount of capital invested by the farmers of Maine; but also, because sheep husbandry is so valuable an agency for the elevation of agriculture in a country of moderate natural fertility like ours, that it can hardly be dispensed with and success attained by other means.

By the agency of the sheep, a great amount of herbage, of a quality which would serve but poorly for any other domestic animal, is readily converted into good meat and wool and manure; and thus we are at once furnished with food and the material for raiment, and with means of fertilization which will insure an increase of food in years to come.

Let the price of wool be so reduced that the farmer becomes constrained to discard the sheep, and it is easy to see that great loss, both direct and indirect, must ensue. What can be more reasonable than the demand, that, in levying the burdens which must be borne, they be so adjusted as to yield all the advantages which the nature of the case admits? I cannot relinquish the hope that such will be the fact, and that adequate protection will be steadily continued for many years to come.

S. L. GOODALE,

Secretary of the Board of Agriculture.

JANUARY, 1867. .

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BRAHMA FOWLS---TAKEN FROM LIFE.
Stock of H. G. White, South Framingham, Mass.

ABSTRACT OF RETURNS

FROM THE

AGRICULTURAL SOCIETIES

OF

M A I N E .

1866.

EDITED BY
STEPHEN L. GOODALE,
SECRETARY OF BOARD OF AGRICULTURE.

AUGUSTA:
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1867.

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ANDROSCOGGIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

I herewith transmit a statement of the success and doings of this Society for the year 1866.

The Annual Show and Fair was held at Lewiston, October 2d and 3d. The weather and travelling were excellent, and we had one of the best exhibitions held since the organization of the Society, both as regards the show of stock and the display of manufactured articles.

The receipts of the Society were less than last year, but the expenditures being less, the balance will show as favorably as then.

The hay crop of this county is less than last year, probably not exceeding in quantity three-fourths of the preceding crop, but the quality has never been surpassed.

The season was very favorable for the growth of the potato, and an abundant crop has been secured.

The corn crop has been very good, both in quantity and quality.

Wheat yielded fairly, though there was but little sown. Owing to the elements of production that were stored up by the soil when first brought into a state of cultivation having been exhausted, and the necessary compensations not having been given to it, this valuable crop has ceased to be of any great comparative value in this section.

The barley and oat crops were large and rarely excelled.

Nature has been more lavish with regard to the fruit crop the present year than the preceding, yielding the farmers of this county an abundant harvest.

There were ninety entries of neat stock "presenting, by general consent, the finest show of the kind ever exhibited on the Society's grounds."

Four town teams of oxen, of twelve yokes and over, were entered. These teams were made up of some of the finest oxen that have ever been exhibited, showing that there has been a decided improvement in the breed of these animals.

Two town teams of steers, of eight yokes and over, were also entered. They were fine looking and well built.

The exhibition of milch cows was good, there being twelve entries. Mr. Rollins of Lewiston entered a valuable grade Jersey cow and calf. He stated that from the milk of the cow two hundred and seventy-two pounds of butter were made in six months, and eleven pounds during the week preceding the Show.

Sixteen bulls were on exhibition, all fine animals. The Jersey bull entered by H. H. Dickey was one of the best we have ever seen.

The exhibition of sheep, swine and poultry was good. It is evident that since the close of the war the rearing of sheep has received less attention than during its progress.

There were fifty-four horses and colts on the grounds. Many of them were very fine animals, giving evidence of superior breeding, and that much attention has been paid to this branch of stock growing.

The exhibition of dairy products was worthy of regard, there being forty-seven entries of bread, butter and cheese, all of which were of superior excellence.

The entries of household manufactures were larger in number than last year, showing that the ladies were much in advance of the "lords of creation" in their contributions to the exhibition. A very commendable spirit of rivalry was manifested from old and young in the manufacture of articles for domestic use, entries having been made by ladies of eighty and misses of five, nine and eleven years, all of which discovered commendable skill; and from examination we became convinced that if any lack of interest is ever manifested in our County Fair it will not be chargeable to the ladies who fill this department.

The manufactured goods exhibited by N. W. Farwell, from their beauty and finish called forth general commendation, and contributed greatly to the attraction of the Fair.

The show of fruit was good in quality but deficient in quantity. Several superior varieties of apples were shown. Mr. Thomas Herbert of Bristol, Lincoln county, exhibited eleven varieties of pears, all of fine quality and adapted to this State.

There was a good display of agricultural implements. Messrs. O. E. Randall, John N. Wood and W. W. Wood exhibited the admirable horse-rake patented by Mr. Randall in 1865. This is regarded as the best horse-rake in the market.

Potter & Thompson exhibited several of their splendid carriages.

Our Show and Fair the present year, as a whole, fully realized our anticipations, and proved that the farmers *do* derive benefit from these yearly gatherings; but we wish to see still more unanimity, more interest and more zeal in behalf of this Society, in order to promote their own welfare.

Amount of premiums offered, \$558; amount of premiums awarded, \$411.

NELSON HAM, *Secretary.*

AROOSTOOK COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

I transmit with this our annual statement of "financial condition and doings." We do not show so large a sum of money raised this year as last, but we have been prospered during the year, and our Cattle Show in September was much superior to the first one, held a year before.

The Society has already excited new interest among the farmers, and a Farmer's Club was started last winter in West Houlton, a direct outgrowth of the Society's influence. I hope the example set by the Hancock County Society may be adopted by our own, and that we shall have those public discussions, which must be so very beneficial to all who attend.

I had hoped to make quite a lengthened report this year upon some topics of local interest, and compare our condition, as regards facility of production and cost of same, with older parts of the State. The brief time now at my command forbids much attention to these things. I have been very busy in setting up a "Beater Hay Press" the last few weeks, and its relations to our agricultural interests are so intimate that I speak of the matter in this Report.

We can easily produce excessive crops of hay in our fertile, easily-worked fields; but up to this time there has been no cash market for it. Stimulated to the experiment by the near approach of good railroad connections with Calais and St. Stephen, we have set up the press, and believe we shall build up a good business.

There is danger that heedless men may sell hay to the injury of their farms, but our lands are so productive that we may well sell a good deal of this most valuable commodity.

Our Annual Address this year was delivered by Hon. P. Barnes of Portland. It set our farmers to thinking, and I notice that many are carrying its theory into practice this fall. (See page 99 of Report on autumn cultivation.)

I am satisfied that to prepare the ground in the fall is the true way of doing the work, and in so doing we but make the best use of nature's coöperation in the work of producing food for man and beast.

I hope another year to be more at leisure to enter into matters of interest to ourselves and others seeking information about the advantages and capabilities of Aroostook county.

Amount of premiums offered, \$266; amount of premiums awarded, \$134.

FRANCIS BARNES, *Secretary*.

CUMBERLAND COUNTY AGRICULTURAL SOCIETY.

This Society had made due preparations to hold its Annual Fair in Portland, but the great fire of July 4th and 5th prevented the arrangements from being carried out, and none was held.

PORTLAND HORTICULTURAL SOCIETY.

This active and efficient Society, notwithstanding the total destruction of its flower stands, cases, glass ware, vases and other furniture, held an autumnal Show, which was as successful as the unusually limited accommodations at their command would permit.

Amount offered, \$347; amount awarded, \$233.

HANCOCK AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Of our Society I am able to make a favorable report. It has been in operation nine years, and numbers some five hundred members. It has gradually progressed from a small beginning—having but thirty-seven members at the date of its organization—meeting and overcoming the obstacles in its progress with a steady perseverance. Opposition is gradually dying out, “and the few left will be laid aside soon, like fossils in the new alluvia now forming.”

Very few county agricultural societies can show a better financial condition. The balance due upon the land is now quite small, and the prospect is good that we shall soon be free from debt.

We have a large fair ground fenced and suitable buildings thereon.

Its Ninth Annual Fair continued through three days. Although the weather was for the greater part of the time very unfavorable, the Exhibition was the largest and best ever held under the auspices of the Society. While the old competitors, farmers and farmer's wives, were present with their stock, and specimens of handiwork, many new faces were to be seen in the jostling crowd. Nearly every one seemed good-natured, interested and pleased. The listless lookers-on, and the *wet blanket* men, will soon only be known in antiquated history.

The number of entries far exceeded that of any preceding year.

The benign influences of the Society are seen, felt and acknowledged, not only within the entire circle of which it is the centre, but diffused over the face of the entire county. It is to be seen in better stock, improved farms and larger crops. The improvement in our stock is very manifest. We have, as yet, but few “Herd Book” animals, but such as we have are excellent representatives of their class. Of grades, no county has, we think, excelled us in the same period of time. Nine years ago, at the date of the organization of the Society, not a pure bred animal was known, as such, within the limits of the county.

The old proverb “every crow thinks its own young the whitest,” was universally adopted; each owner looked upon his *own* “na-

tives" as the best cattle in the county. These annual gatherings have disabused the farmers of such faulty ideas, and substituted both a demand for and a supply of known valuable stock. There is yet a wide margin for improvements, but in view of the progress already made is hope for a brighter future. The good work thus begun cannot "breed back" again.

The samples of farm products displayed far exceeded in value and number those of any former year, with the exception of corn. The wet season made this crop a failure.

Perhaps no one cultivated crop has received such an impetus, and the culture of which affords such ample returns, as that of the cranberry. For the first few years only now and then a solitary claimant for the exceedingly liberal premiums to encourage its cultivation; now there are more exhibitors and competitors for the premiums offered for cranberries than for any other field crop; and every year is adding its quota to the list of successful producers.

Last year, for the first time, premiums were offered "on farms," the awards to be made at the close of the third year. Thirteen were entered, which has stirred up a very commendable spirit of rivalry.

This year we are attempting the experiment of agricultural discussions, under the auspices of the Trustees, with what success remains to be seen.

That our Society is still advancing in its usefulness is evident to all, by the introduction and rearing of the improved breeds of domestic animals, the more thorough cultivation of the soil, the introduction of improved implements of husbandry, and the different varieties of roots, grain and fruit. We are better prepared to meet the wants of all, and inspire confidence in our ability to secure greater results from our future labors.

Amount of premiums offered, \$1061; amount of premiums awarded, \$788.

SAMUEL WASSON, *Secretary.*

Ellsworth, Nov. 30, 1866.

KENNEBEC COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Another year has passed, and we are to report what has been presented to us from the Giver of all our blessings.

Never since our recollection has there been a season when the labors of the husbandman in this section have been more signally blessed. The season for putting the seed into the ground was unusually favorable. In most cases the blade soon appeared, in a few instances, however, the weather proved too dry or the planting too shallow, but there was hardly a single piece of land that did not produce the desired crop. Then the hoeing and harvesting seasons were equally favorable, especially for the hay crop, which has been pronounced to be, by many competent judges, equal to that of last year, although not so much in bulk, yet in weight and quality enough better to make it equal, or even better.

The apple crop has been equal to the most insatiate desire of the farmer, and the prices have been such that the avarice of many has tempted them to palm off on the buyer, as fruit of the first quality, apples that had it not been for their own mark, which they were obliged to place on their barrels, they would have denied as ever having come from their orchards, and would denounce the man that would offer such fruit for sale as wanting in common *honesty* (and this would be a mild term). Probably there never has been as much money brought in this county in one season before for this one product.

The cranberry is also receiving some attention. Mr. Isaac Foster of Winthrop has a small patch of land which a few years ago produced nothing but alders and some coarse swamp grass, this year yielded him about thirty bushels of very nice cranberries, equal to any that are brought into our market from other States. These gave him a very large profit on all his outlay. Others are following his example, and I doubt not will meet with good success.

Our Show and Fair was all that we could reasonably ask it to be. The weather delightful, attendance good, entries and exhibition of almost everything within our limits, except milch cows, truly commendable. The show of oxen was never equalled before

at any of our exhibitions. It was estimated by the Committee that there were over twenty thousand dollars (\$20,000) worth of oxen present.

The prize for the best working oxen was strongly contested, and excited much interest.

There were a few good milch cows present, but the excuse of the dairyman is, that no premium can be offered by any County Agricultural Society that will compensate him for driving his best cows to the Show. How far this is true I will not pretend to say. Good cows are not likely to be benefited much by being driven from home, I will admit; yet there are some who look a little beyond present self-interest.

The show in the dairy products, particularly in butter, was excellent, never better; at the close much was sold for large prices. The cheese was thought by some not to be quite equal to that of former years, yet very fair.

The ladies department of household manufactures was in many respects truly superb. The really useful articles, such as quilts, blankets, socks, hose, mittens, &c., &c., were there in great abundance, and the ornamental kept pace with the useful.

The department of fruits and flowers was never excelled—the flowers never equalled at any Show of ours for their number, variety and perfection, which attracted much attention, and added much to the beauty.

The Address before the Society, delivered by W. B. Snell, Esq., Preceptor of Monmouth Academy, was full of interest and eloquence. It was listened to by a large and appreciative audience. The singing was by a choir from Fayette, led by F. A. Chase, Esq., which gave much interest to the occasion.

The Society was never more prosperous than at present—peace and harmony existing to a greater extent than it is the common lot of agricultural societies to enjoy.

We are out of debt, and have a small sum in our treasury. Our land is leased for a term of years, and enclosed with a good tight fence, having a trotting-park one half mile in length. Also a substantial Show Building, with suitable rooms for Secretary, &c., not yet owned by the Society, but which probably soon will be.

Amount of premiums offered, \$408; amount of premiums awarded, \$809.

DAVID CARGILL, *Secretary.*

NORTH KENNEBEC AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The show of live stock this year was unquestionably the largest and best we ever had ; while the exhibition at the Hall was, on the whole, very satisfactory ; for, although some of its departments were but sparsely supplied, others were full to overflowing. The attendance, however was smaller than last year, and although as many membership tickets were sold, yet the receipts fell off about fifty dollars. This was the result of two causes : 1st. The pleasant weather with which we were favored, followed a long period of rain, and farmers felt it their duty to improve it at home in securing their crops ; and 2d. There were three agricultural exhibitions in the county ; one in Skowhegan, and a town show in China, in our immediate vicinity on the first day. If the arrangement of these exhibitions are measurably within the control of the Secretary of the Board of Agriculture, it would seem to be demanded of him that he should interfere to prevent a conjunction so undesirable, in the future.* Many persons would be glad to attend each of these three exhibitions, who, with the existing arrangement, find it impossible to be present at more than one. The time of holding our show has been the same ever since the organization of the society, and latterly the other societies have selected the same week.

All departments of live stock were unusually full, and the improvement in quality, as compared with our earlier exhibitions, furnished gratifying evidence of the usefulness of our organization. The number of horses, in all the classes, fell but little short of a hundred ; and the most pleasing feature of this department, (characterizing other departments, also,) was the superiority of the young over the old. A great advance has been made in this interest throughout the whole State, and in no part of it are good horses and promising colts plentier than in the valley of the Kennebec.

* It is in no measure under the control either of the Secretary alone, or of the Board of Agriculture as a whole. The matter has been agitated at several sessions, but upon a full comparison of views, action was deemed inexpedient by a majority of the members.

The display of neat stock was also a triumph in number and quality. Six competitors, Samuel Taylor, Warren Percival, Geo. Rice, Henry Taylor, H. C. Burleigh and Wm. Nowell, entered the lists for the herd premiums, bringing, in the aggregate, eighty-six animals, ranging from thorough-bred to native. Mr. Percival's twenty-eight choice Durhams, all herd-book animals, made no small exhibition by themselves, and were highly creditable to the enterprise of this well-known stock grower; but we fear that the merits of his stock were not fully appreciated by all the committees to whom they were submitted. The number of thorough-bred bulls on the ground was large, with many fine grade animals; and the long rows of noble oxen made a gratifying sight. The show of cows was superior to any former exhibition, and included several choice Jerseys, which continue to grow in favor. The Heifers numbered forty-two, and gave evidence that an abundance of good cows are growing, and that butter ought to be cheaper at some time.

The number of sheep was double that of any former show; and we think there has been a greater growth and concentration of interest in this department than in any other within the province of the Society. As evidence of this, may be mentioned the organization of the "North Kennebec Wool Growers' Association," which commenced active operations last Spring, with a remarkably interesting and successful sheep-shearing festival at Waterville. The advent of the "Green Mountain Boy," too,—a choice thorough-bred Merino buck, brought here by Eph. Maxham, the equal of which, considering his age, build, fleece, and stock-getting properties, was probably not left in Vermont, his native State—has given a wonderful start to the sheep fever in this section. This animal was present at the exhibition, with several of the noted "Ladd Bucks," from New Sharon, and other choice specimens. George Richardson & Son, John Athearn, A. G. Ricker and Dr. N. R. Boutelle, presented flocks of choice Merinoes; Joseph Percival and George W. Hubbard, competed in coarse wools; Mr. H. G. Abbott was present with his large and choice flock of medium wools, which were admired by all who saw them. The grade of sheep which he thinks he has established, is that happy medium that just fills the eye of a large majority of our farmers.

The show of swine was unusually large, and embraced specimens of Suffolks, Chesters, Prince Alberts, and two Province shotes, presented by W. A. P. Dillingham.

In the Poultry department, too, there were large numbers of choice representatives of all classes, and a very interesting exhibition.

The Fair at the Hall, which opened as usual, on Tuesday evening with a pleasant social gathering, enlivened by music from Mrs. H. Taylor, Mrs. L. A. Dow, Miss Lucy Carroll, Miss Abby M. Hawes, and others, was one of which we had no reason to feel ashamed. To be sure, the supply of domestic manufactures, though fair, was not large; but the full display of fruit, dairy products, samples of crops, fine arts, miscellaneous articles, etc., made ample amends; and the display of farm implements by Messrs. W. A. P. Dillingham and Joseph Percival, was such as never greeted the eyes of visitors at any previous exhibition.

The central point of attraction in the Hall, was a large table of agricultural products, from the farm and garden of Hon. W. A. P. Dillingham, which of itself would have saved the exhibition from failure. It embraced fine samples of wheat, corn, pumpkins, squashes, three varieties of potatoes, four of beets, cabbages, carrots, eleven kinds of choice apples, five of grapes, tomatoes, jars of butter, several bouquets of cut flowers, etc. In addition to a liberal gratuity, the Society very properly tendered him their hearty thanks for this large contribution.

The contributors to the Fruit department, included those original members and early supporters of the Society, the brothers Taylor, Samuel and Joseph, Hiram Cornferth, Stephen Nichols, W. A. P. Dillingham, George Richardson, Galen Hoxie; and last, but not least, though ruling over a small village garden, Lemuel Dunbar.

The department of Fine Arts, embraced many rare gems of beauty, prominent among which may be mentioned the large collection of photographs, presented by Mr. O. J. Pierce, of Waterville; many of which are faithful copies of pictures and statues that have a world-wide reputation. By the introduction of these gems of art into the homes of the people, he is doing much to elevate and refine society, and to a certain extent, should be regarded as a public benefactor and encouraged and rewarded accordingly.

Of the numerous articles in the Miscellaneous department, many of which were curious and interesting, we will mention only two contributions,—a collection of insects made by Master Edson F. Hitchings, and a rustic chair and sofa, constructed from the twisted roots of trees, by Joseph Taylor of Belgrade. The sculptor, who

in a rough block of marble, sees an angel, is pronounced a genius ; and it must have been something akin to the divine quality of mind and soul possessed by the true artist, that enabled friend Taylor to see these beautiful and curious pieces of furniture in the tangled maze of roots, with no form nor comeliness to a man less gifted to discover beauty and harmony everywhere. They excited the wonder and admiration of all beholders, as rare products of mechanical genius, artistic taste, and patient labor ; and the committee very fittingly awarded to them a copy of Whittier's poems, which we know the recipients will prize much beyond its value in money.

The Trustees having fixed the premiums on a very liberal scale this year, and there being a falling off in the attendance, our receipts are not sufficient to meet the awards and incidental expenses by a little over a hundred dollars ; but we have no debt to provide for, and there is money enough in the treasury to satisfy all lawful demands upon it.

This year, as in former years, we have had trouble in filling our committees with the right kind of men, who, with proper notice of their appointment, would come prepared with carefully considered and well digested thoughts bearing upon the particular department assigned them, the presentation of which, on the last day of the exhibition would furnish a very good substitute for a set address. Those originally appointed and notified, too often fail to appear, and their places are filled at short notice by others, who are not prepared, even if they possess the proper qualifications for the labor thrust upon them with so short notice. As a consequence, therefore, many of the reports are very meagre, containing little beyond the bare awards, with no adequate notice of the animals or articles submitted to their inspection, while those which fail to take a premium are too frequently ignored altogether. To this, however, we are pleased to say, there are honorable exceptions in men who have served the Society faithfully and conscientiously, year after year, with no reward but the gratifying consciousness of performing their duty. May they long be spared to bless the Society ; and let us pray for more like them, to labor by their side and to fill their place when they shall be called hence.

Amount of premiums offered, \$675. Amount of premiums awarded, \$466.

DANIEL R. WING, *Secretary.*

KENNEBEC UNION AGRICULTURAL AND HORTICULTURAL SOCIETY.

From the Secretary, Mr. S. Smiley, we have the following :

The Kennebec Union Agricultural and Horticultural Society held its Annual Cattle Show and Fair at Gardiner, Oct. 2d and 3d, A. D. 1866.

The weather was favorable, and the display of manufactures and fruit was as large as has been made by the Society for the past three years.

The number of cattle, horses, sheep and swine was not so great as should have been exhibited by this Society.

Amount of premiums offered, \$575; amount of premiums awarded, \$353.

The following statement of remarkable yield of a cow is from the pen of Nathan Foster, and is quoted from the report of a Committee of which he was chairman :

The writer of this report, without consultation with the other members of the Committee, append the statement of Mr. Benjamin Lawrence of Gardiner, in relation to his cow, which carried the Society's first prize last year. She being lame was not present this year. The cow was ten years old last spring, dropped her calf late in April, and in seventeen weeks, commencing the 5th of May, were made from her milk 210½ pounds of butter, a family of four persons being liberally supplied with milk and cream during the time from the same cow—being a fraction over 1 lb. 12 oz. per day. In seventeen days in June 46 lbs. of butter were produced—2 lbs. 11 oz. and a fraction per day.

Her keeping after turning to pasture in the spring was pasturage only, till within the last three weeks six quarts of coarse shorts have been added daily. She is now giving sixteen quarts of milk, beer measure, per day.

This cow when exhibited last year was represented to be a grade Jersey, Mr. Lawrence believing her to be so. In conversation with him recently I learn her dam was driven by himself to Mr. Gardiner's farm for this calf. At that time (eleven years ago) the farm was under my care, and the only animal for that kind of service on the farm was a half blood Ayrshire, from my grade

Durham cow, which I kept till twenty years old. For the production of butter I have no recollection of seeing the cow, or a reliable statement of one, the equal of this in the county or the State. Mr. Boutelle of Waterville exhibited at the North Kennebec Show, some years ago, a full blood Ayrshire, a much smaller cow than this, which had given twenty-one pounds of butter in seven days. But one and three-fourths pounds of butter per day, for one hundred and nineteen days, and still giving milk enough to continue the same quantity longer, is "hard to beat."

LINCOLN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Fair of our Society was held at Waldoboro' Oct. 8d, 4th and 5th, and was well attended. Our show of stock was not large, but of good quality for this locality, especially the young stock. The same remark applies to horses and colts. A gradual improvement has been going on in these departments for some years.

Our show of grain and root crops was superior to that of any previous year. Our samples of corn were very fine, quite a number of large crops, well ripened, having been raised in this vicinity.

Of fruit there was a large quantity and in excellent condition. This department is one of the main and most attractive features of our indoor exhibitions.

Our Exhibition the present year we think fully up, and in some departments superior, to any previous Fair of this Society.

Amount of premiums offered, \$650; amount of premiums awarded, \$488.

C. C. ATWELL, *Secretary.*

OXFORD COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The twenty-fourth Annual Show and Fair of this Society was held Oct. 9th, 10th and 11th, 1866. The weather was favorable, and the number of visitors large. The exhibition of stock-horses, trotting-horses, mares and horses and colts was large, there being fifty-six entries, embracing many fine specimens. The trotting was spirited, and appeared to interest a large crowd of visitors. The entries for neat stock were numerous, embracing twenty yokes of working-oxen, two herds, three town teams, and a number of bulls, steers, cows and heifers. The exhibition of neat stock constitutes an important part of our Shows. The number of sheep entered was small. No swine were exhibited. The display of dairy products, although not large, contained some very nice specimens of both butter and cheese. The present high prices of the products of the dairy ought to be a sufficient inducement to our farmers to enlarge their operations in this department. The competition for premiums on field crops is not what the importance of the subjects requires. Applicants for premiums on crops frequently make entries at the time of the fair, but neglect to make the subsequent statements required by law. C. H. Durell of Paris raised 50½ bushels of excellent wheat on two acres, and William Frost, Jr., of Norway raised 240 bushels of ears of corn on one acre. An abundant crop of corn has been harvested in this vicinity the present fall, and though not so fully matured as the crop of 1865, still the average quality is good. The wheat crop was better than it has been for many years. The exhibition of fruit was large and the quality good. Uriah H. Upton of Norway presented thirty-one varieties of winter and twenty-two varieties of fall fruit. William R. Swan of Paris presented twelve varieties of winter and eight varieties of fall fruit. In addition to apples, specimens of pears, grapes, plums and cranberries were presented. Numerous specimens of vegetables were exhibited, among them a squash by Rev. Ransom Dunham of Bryant's Pond, which weighed 195 pounds. The display of domestic manufactures was not so large as at some previous Shows, but some nice

specimens were to be seen. Some good articles of agricultural implements, such as plows, horse-hoes and horse hay rakes, were entered, besides a large number of smaller articles. Fifty-four entries were made under the head of miscellaneous. On the whole, our Show of the present year has been a successful one.

Amount of premiums offered, \$278; amount of premiums awarded, \$263.

ELLIOT SMITH, *Secretary*.

WEST, OXFORD AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Sixteenth Annual Exhibition of this Society was held at their grounds in Fryeburg, Oct. 9th, 10th and 11th. The weather was favorable, and as many, or perhaps more, were in attendance than any year preceding, as the receipts were larger.

There were on exhibition not as many live animals as have been presented at some former Fairs, but the quality suffered no depreciation. The amount of premiums offered by the Society for horses was \$57.50; the amount awarded \$29.00. The amount offered for neat stock, \$115.75; the amount awarded, \$46.50. This falling off is certainly not owing to any diminution in number of good animals within its limits. Horses are owned hereabouts for which \$1500 is said to have been refused, and within sight of their grounds an ox team of ten or a dozen yokes, all above seven feet, could have been collected, and yet neither were present.

Dairy products appeared in abundance and merit. Sixteen dollars were awarded in this department.

The housewives and the ladies in general filled the hall with generous displays of articles of domestic and fancy manufacture. This has always been a prominent feature in our Fairs, and may it not depreciate in future. The high prices of woollen and cotton fabrics have stimulated many to ply the wheel and the loom anew, and not a few of the younger members have learned for the first time what music there is in their hum, and economy and comfort in their products.

Fruit was never presented in more pleasing variety. One man exhibited nearly sixty varieties of apples, several of pears and

grapes, and other exhibitors equalled him in quality if not in numbers. Many are paying particular attention to their fruit trees, and no doubt will find it highly promotive of enjoyment, economy and health.

The maple, too, must not be left out of consideration. There are within the limits of this Society thousands and thousands of trees which yield annually more syrup and sugar than we believe can be offered by any other society. Some splendid samples were exhibited, much of the sugar appearing almost as white as the refined sugars of the market, yet we think a large portion of that delicious flavor is extracted by such thorough bleaching.

In making the abstract more general, we may add that the labors of the husbandman for the past year in this region have been pretty liberally rewarded in an abundant harvest. Most of the leading crops were above the average, if perhaps we except hay. This, owing to previous dry seasons, winter-killing, and last, though by no means least, the destructive influence of myriads of grasshoppers, was somewhat of a failure. Much that was gathered was poorly prepared for the barn, owing to the continued falling weather throughout the season. Mowing and raking machines are numerous used, there being about one hundred of the former owned and used in the town of Fryeburg alone. Some other towns are not quite so favorably situated for its general introduction.

Of corn, next in importance, there was a good crop, though not up to the expectations of the farmers earlier in the season. A cold and wet September interfered materially with its full development.

Potatoes were exceedingly good in quality and quantity. The horse-hoe is being somewhat introduced now in their culture as well as corn.

Grain abundant, but little wheat, however, has been sown for a number of years, the main crops being oats and rye.

The prices of all products of the farm are yet in high figures, notwithstanding their abundance, and we can see no reason why farmers are not a happy and prosperous people, unless, indeed, it be just now they suffer from undue plethora of purse.

But after all the abundance the earth yieldeth and the yeoman's thrift, there is a hesitancy, a lack of interest in them to bring such forward and compete for premiums. Perhaps the premiums are

not *large* enough to satisfy them. If the object is a *great gain*, certainly they are not. Most societies in their infancy struggle with a load of debt, and can ill afford to make an attractive premium list. This has been the case with this organization; but we are now in a better financial condition—out of debt. We have therefore revised and raised the premiums, and shall, as further prosperity allows, offer still larger inducements. Shall try the experiment of holding the next exhibition for two days instead of three; and we hope that our present prosperity may be only a dawn, which will grow to a glorious noontide.

Amount of premiums offered, \$364; amount of premiums awarded, \$223.

D. LOWELL LAMSON, *Secretary*.

EAST OXFORD AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Our Sixth Annual Exhibition was held at Canton. The morning of the first day was occupied by a business meeting of the Society, for the choice of officers, etc. The exhibition of neat stock and sheep, examination of the same by committees, plowing and drawing match, occupied the remainder of the day. The number of working oxen entered was large, many of which were of superior quality. The town teams from Livermore, Hartford and Canton, were splendid. Beef cattle and steers were well represented; of cows and heifers the exhibition was not so good, though the high price of butter and cheese would seem to be a sufficient inducement for farmers to give particular attention to the improvement of dairy stock. There was a better exhibition in the sheep department than usual, though small yet. We have not given so much attention to the raising of sheep in this section as in many other sections of this State, but the interest in this department is on the increase, and quite a number of improved breeds of bucks were exhibited. Two teams plowed with good success, and gave general satisfaction. The drawing, with oxen, of a large load of stone on a drag, attracted considerable attention, especially a class of curiosity seekers, but by the more candid persons this practice is

looked upon unfavorably. Would it not be better to give this attention to the best disciplined oxen, that would do the usual work of the farm in the most quiet and best manner, and not grant a premium to him who by the utmost possible exhibition of nerve of himself and oxen could barely start the most load?

The exhibition of horses and colts, of which there was a fair show, came off the morning of the second day. The Society and citizens met at 11 o'clock, to hear the Agricultural Address, by Albion Thorn, Esq., of Canton, which was able and instructive. There appears to be a lack of interest in the department of grain, roots, etc., so that we get but very few applications for premiums on corn and grain, or roots. I have thought that our Society does not offer that inducement for competition in this department that it should. If our farmers would take to the Exhibition more samples of their products, without thinking that they must be the very best, so as to take the *premium*, as though this was the sole object—but would rather present them to increase the interest of the exhibition, and to give a greater variety, to aid in forming an opinion as to the best variety for a certain location. The exhibition of butter and cheese was good. The display of apples, pears and grapes, was creditable. The importance of fruit raising does not appear to be sufficiently appreciated. We do not give that care and attention to the nursery and orchard that our interest demands. The display of vegetables, agricultural implements, domestic manufactures, needle work, etc., was good and interesting.

The crop of hay was generally rather light, though of good quality. Corn, about an average crop. Wheat has not been so good for many years. Potatoes, a fair crop. Oats, fair. Hops are raised to considerable extent in this section, but the crop was very light this year, in consequence of being badly winter killed last winter, and also from the effects of lice.

Amount of premiums offered, \$182; amount of premiums awarded, \$124.

WM. K. GREEN, *Secretary*.

PISCATAQUIS AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Piscataquis Agricultural Society held its Annual Exhibition at the trotting park in Foxcroft, Oct. 3d and 4th. It was the most successful exhibition ever held by this Society. One hundred and fifty new members were added to the Society. There was a large amount of neat stock on exhibition, especially oxen and steers; and a finer lot of large, well-formed cattle are seldom seen together. This is due, in a great measure, to the Short-horn bull, brought into the county by William Downs, of Dover. Although a grade claiming to be three-fourths Durham, one-fourth Hereford, his stock is almost faultless. He was sent to the shambles some two years ago, and we presume his stock will soon be extinct, as but few heifers were raised from him, and most of those shared the same fate before two years old. We seldom see bulls at our cattle fairs over three years old; so that by the time one is known as a good stock-getter he has been destroyed. It would be well to offer large premiums for bulls four years old and over, as it is generally acknowledged by breeders, that stock from mature animals is much better.

There was a good exhibition of horses, and especially of colts; showing that there is a marked improvement going on in the rearing of this noble animal. Farm stocks were well represented, and show that progress is being made in the right direction. Crops of all kinds are unusually good. Of hay we have full an average, although grass was badly winter-killed. Frequent showers in the spring and copious rains later in the season, caused resuscitation that gave us a bountiful crop of very fine, good hay, when not damaged by the weather. Although some of it was very late cut, it was of fine quality; most of it remaining green until the last of August. Wheat has done very well. There was but one entry for premium, that for 27 bushels per acre, which we think is not much above the average crop for the last four years would warrant; especially when we take into consideration its superiority as a crop to seed grass with. Other crops of grain are a full average.

Potatoes, which are our leading crop for feeding purposes, have yielded largely. Premiums were awarded for 382, 374, 251 bushels per acre, all of the Orono variety. Corn, premium crops were 91, 79, 59½ bushels of ears per half acre. There is an improvement in all the branches of farming. Farmers are beginning to think, and read. The consequence is, better management of stock, better tillage, and more permanent improvement. Much of this waking up is due to agricultural societies.

Amount of premiums offered, \$236; amount of premiums awarded, \$116.

PHINEAS M. JEFFERDS, *Secretary.*

NORTH PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

This Society, consisting at this time, of 290 members, held its fifteenth Annual Exhibition at Lincoln Village, October 3d and 4th. The attendance was large, and more than usual interest was manifested.

The entries of horned cattle, were 103 in number; of horses, mares and colts, 68.

A new and interesting feature was the presentation of entire herds of cattle.

Among the horses, beside other choice animals, was the celebrated Knox colt, owned by John A. Eames, of Passadumkeag, which took the first premium. There was also a good show of sheep and swine.

At the Hall was a very credible exhibition of domestic manufactures, dairy products, fruits and fancy articles, and more extensive than usual.

Among the premium crops were wheat by J. C. Emerson of Lincoln, 33½ bushels per acre; also 24 bushels by Samuel Hall of Lincoln.

Barley, 50 bushels per acre, by Mr. Hall, and 45 bushels by Mr. Emerson.

Potatoes, 288 bushels on one acre, by Horace Brown of Carroll,
Oats, 56 bushels per acre, by George W. Thayer of Chester.

Indian corn, 80 bushels ears on half an acre, by Shepard Bean of Lee; 71½ bushels ears by William R Hersey of Lincoln.

To A. J. Heald was awarded a premium for largest product on one farm (excepting hay), being for corn, wheat, barley, oats and peas, beans, potatoes and pumpkins, grown on twelve acres, and estimated by the Committee to be worth \$840.50.

The hay crop was very heavy, although much reduced in value by continued rains during nearly all haying time.

Indian corn was good on dry soil, but on land naturally wet almost a failure.

Potatoes, great growth of tops, but being struck with the rust did not mature as last year. Reduced by rot from ten to fifty per cent. Quality bad.

Wheat, a better crop than for several years past, some raising as high as forty bushels per acre. Benjamin Whittier of Lee raised twenty-two bushels from one-half acre.

Oats, a great yield, and heavy.

Barley, very good.

Buckwheat, not much raised.

Beans, a fine crop, though somewhat injured by rust. C. House & Son of Lee have raised the present season over one hundred bushels good ones, worth from \$2.75 to \$3.25 per bushel.

Improvements.—During the two past years six or eight mowing machines have been introduced within the limits of our Society, and successfully used; others are preparing their farms for their use. In fact our farmers generally, those who are worthy the appellation, are availing themselves of the improved implements of husbandry.

Comparing the present with the past few years, a manifest improvement is noticeable in every department of agriculture. All kinds of stock, especially sheep, are very much in advance of the past; and every man who makes farming his entire business has no reason to be discouraged.

In our midst are three tanneries—Webb & Co. of Lowell, Burland of Lincoln, and Messrs. Kingman & Co. of Winn, or Five Islands, as it was formerly called. All of them are in successful operation, and doing a paying business. The one at Winn is larger than any other on the Penobscot. About three years ago the first blow was struck for its erection, and two years have now elapsed since it commenced running—consuming from twenty-five

to thirty cords of bark per day, and giving employment to some three hundred men.

Amount of premiums offered, \$365; amount of premiums awarded, \$202.

SHEPARD BEAN, *Secretary*.

WEST PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

This Society held its Twelfth Annual Cattle Show, Exhibition and Fair, at East Corinth, September 25th and 26th, 1866. The weather was unfavorable—a rain storm set in early on the first day and continued at intervals through both days, damping very much the out-door department.

The show of stock was, however, very good. Oxen and steers in particular were extra; and the trials of strength and discipline by oxen and horses were superior to any former exhibition.

The Show in the Hall was very attractive—more so perhaps on account of the rain and mud outside. The fruit department was excellent; the specimens of crops very good. Large entry of butter and cheese of superior quality, and a fair display of preserves, jellies, etc., were on the tables.

Of domestic manufactures, needlework, paintings, fancy articles, etc., the Committee remark: "The display of articles in this department was not so full as in former exhibitions. The unpleasant state of the weather was no doubt the principal cause. It was gratifying, however, notwithstanding all the impediments that presented themselves, to witness the many evidences that industry, economy and taste were something more than mere names amongst the fairer portion of our race. It was pleasing and flattering too to witness the various ways in which these virtues were combined in order to contribute to the welfare and comfort of man. The firm, thick, fullered clothes, the soft flannels, the nice double mittens and hose, and woollen blankets, all to protect us from the cold during the rigorous winter. The beautiful hearth-rugs and patchwork quilts were tangible proofs that economy, that handmaid of prosperity, was consulted in these contributions

to our welfare, and that while our comfort was enhanced, our pockets were not depleted. The specimens of needle-work and the crocheting demonstrated that not only industry and economy but even taste had been brought into requisition to add to our welfare and comfort."

The crop department opened with a large entry, but many failed to appear with the necessary statement. N. H. Shaw of Exeter, produced from one acre $31\frac{1}{2}$ bushels wheat; from another acre $87\frac{1}{2}$ bushels corn; from another acre 51 bushels oats and peas, and from another acre 262 bushels potatoes. E. F. Crane of Kenduskeag produced from one acre 27 bushels wheat; from another acre $90\frac{1}{2}$ bushels corn; from another acre 39 bushels barley, and from another acre 330 bushels potatoes. E. B. Stackpole of Kenduskeag produced from one acre 21 bushels wheat; from another acre 27 bushels buckwheat; from half an acre 112 bushels potatoes; from one-fourth acre $7\frac{1}{2}$ bushels beans, and from one-eighth an acre 60 bushels carrots. B. Baston of Levant produced from one acre 51 bushels barley. W. E. Atwood of Kenduskeag produced 501 bushels ruta bagas from five-eighths of an acre. Jacob Eastman of Exeter produced from one acre 62 bushels corn; from another acre 248 bushels potatoes, and from half an acre 136 bushels potatoes. Mrs. A. Blake of Corinth produced 79 bushels corn from 155 square rods.

Seventeen new members were added, and we judge from indications considered unmistakable, that had we been favored with good weather our Show would have surpassed any other held in this place.

Amount of premiums offered, \$644; amount of premiums awarded, \$261.

T. P. BATCHELDER, *Secretary.*

PENOBSCOT AND AROOSTOOK UNION AGRICULTURAL
AND HORTICULTURAL SOCIETY.

SECRETARY'S REPORT.

After a suspension of three years, our Fair this year was a success. It was held on the 11th of October at Patten. The day was pleasant, and the collection of people, farmers and others, was large. It was emphatically a farmer's holiday.

At 11 o'clock A. M. the Society assembled at the academy and listened to a practical address by the the Rev. E. Fobes of Patten, after which the Society again assembled in the Academy Hall and partook of a farmer's dinner, furnished and prepared by the ladies of the Sidewalk Society of Patten Village. After the dinner was disposed of, the awarding committees attended to their duties.

The collection of horses and cattle was not so large as in some past years, but those exhibited were better than usual, showing the fact that our Society has paid attention to the improvement of stock.

Several valuable horses were on exhibition, among which was a stallion two years old, owned by Mr. Edward Jackman of Sherman. Mr. J. S. Hall of Patten and Mr. Rand of Sherman exhibited colts that were valuable animals. There were other good colts, 27 in all.

Mr. J. S. Hall, Mr. Stimson, and Mr. Joy of Patten exhibited each a pair of working oxen that were large and valuable animals.

Mr. Phelps of Mt. Chase exhibited a large and valuable stock cow and two good heifers.

There were many other valuable animals on the ground that deserve favorable notice.

The cattle were mostly of the Durham grade with a cross of the Devon.

Although there are many good flocks of sheep within the limits of this Society, only one was on the ground, and that was owned by Mr. Thomas Myrick of Mt. Chase.

This country is well adapted to wool growing. Sheep do well and pay well. Wool and lambs sell for cash at our doors.

Mr. James S. Mitchell of Patten keeps on his farm 100 sheep;

his income from wool and lambs amounted this year to about \$500 in cash. Many other farmers with smaller flocks of sheep have found them equally profitable.

In the ladies department were many articles of home manufacture, which were good and valuable, such as all wool cloth, cotton and wool cloth, blankets, flannel, drawers, mittens, yarn, quilts, carpets, rugs, stockings, and fancy articles.

Many varieties of apples were on exhibition, grafted and native apples. A. Cushman, Esq., of Sherman, H. N. Darling of Patten, C. O. Brown of No. 6, were the principal exhibitors of fruit.

I have said nothing about hogs, but this is not a subject of small importance, when pork is worth \$50 per barrel. Some of our farmers make pork raising a profitable business. Mr. S. Wiggin of Patten slaughters every year hogs that weigh 500 to 700 pounds each, which at 16 to 18 cents per pound amounts to quite a pile of cash.

Oat raising is another item of farming which does well. Mr. J. B. Leslie & Bro. raised this year, on their farm, on the plow, 900 bushels of oats, which sell at 75 cents per bushel—\$675.

Why should our young men go west to make farms, when cheap lands and good lands and good crops and good markets can be found in our own State?

All business is based on cash. Show our young farmers how they can raise the dollars and cents on their farms and there will be no want of energy; they will cut down the trees and turn up the sod, and farming will go ahead. Farmer's colleges and farming improvements and improved stock, are all well enough, but the main question after all is, how shall we get the dollars, how shall we pay our bills?

Amount of premiums offered, \$150; amount of premiums awarded, \$95.

LUTHER ROGERS, *Secretary.*

The following notes are furnished by Mr. A. Cushman:

The past season has been favorable for crops of all kinds. The frequent rains produced an abundant crop of grass, but much of it was damaged in harvesting, the haying season being wetter than was ever known here before. Intervales were overflowed most of the time during the season for cutting grass, and most of them remain uncut.

Wheat has been invariably good. The two prevailing scourges of wheat have been unknown the past season. Neither rust nor midge have done any damage the two past summers. Its cultivation is on the increase.

Corn has produced an abundant harvest for all who planted and treated it properly, as the entries at our Society will show. More should be planted.

Oats have produced abundantly, and the grain is unusually heavy, often weighing 37 or 38 pounds per bushel. They are now worth 75 or 80 cents per bushel.

Barley has done hardly as well as usual, not producing the usual number of bushels, yet the grain is good. It is not extensively cultivated.

Buckwheat as usual is good. It yields well on poor land, and farmers depend upon it mainly for making their pork. It is generally quite a valuable crop, easily harvested, and leaves the ground more light and less impoverished than any other crop.

Rye whenever sown returns a fair compensation for labor, but there is but little sown.

Peas as a field crop are but little cultivated, but will do better on poor, worn out land than any other grain, and leave the land in good condition.

Beans have been more damaged than any other crop the past season, being rusted by the excess of wet weather, though in some cases the yield was very good.

Potatoes have resulted much better than was expected. The exceedingly wet weather rusted the tops, and it was feared the rot would destroy the roots; and in some instances it did make its appearance, but has done very little injury. The crop was good and the quality fair.

The past season has been very poor for fruit, by reason of a small worm which made its appearance in the blossom buds before they were in bloom, destroying from a few on a tree in one case, to the whole in another. Late last fall small, light-colored millers were flying around the trees, and probably deposited the eggs in the blossom buds, from which the worm above referred to proceeded. The forest was filled in this vicinity with an innumerable number of those millers, one and two years ago, and the result was, the June following the trees were covered with worms, who devoured the leaves, and made the trees almost as leafless as in

January. Those on the apple trees were the same. If they stood near the forest they were injured more, if further off they suffered less. My orchard would have probably produced four or five hundred bushels of apples if the worms had let it alone, as it was I got one hundred. Apple trees look healthy and vigorous.

NORTH WALDO AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Fifth Annual Show and Fair of the North Waldo Agricultural Society was held at Stevens' Trotting Park in Unity, October 9th and 10th, 1866. The weather was very fine. The number of entries as large as usual. The show of neat stock, horses and sheep was good, and they were all in good condition, the fall feed never having been better in our locality. The Show at the Hall was excellent. A good display of fruit, and the report of farmers is of large crops of corn. Wheat and potatoes were better than usual. Some of our farmers report their wheat at from thirty to forty bushels per acre. Potatoes from three to four hundred bushels per acre.

Amount of premiums offered, \$285; amount of premiums awarded, \$262.

ELI VICKERY, *Secretary.*

WALDO COUNTY AGRICULTURAL SOCIETY.

REPORT OF SECRETARY.

The Annual Show and Fair of this Society was held October 17th, 18th and 19th. The weather was fine and the attendance unusually large. The entries of stock were 137. At the Hall 193 entries were made, being a larger number than in previous years.

The character of the cattle exhibited was highly creditable, embracing Devons, Herefords, Durham and Ayrshire. The show of sheep was not what it ought to have been; and few swine were shown. Colts were very good. Fine specimens of farm, carriage and work horses were present.

The fruit show was good, but not up to last year. Roots and garden vegetables were shown in profusion and excellence; also fine samples of grain, oats, peas, beans, barley, wheat and Indian corn.

The Fair closed on the 20th, having proved one of the most successful ever held by the Society. The weather was fine throughout, the attendance much larger than ever before, and the receipts over a thousand dollars.

Amount offered in premiums, \$705; amount of premiums awarded, \$631.

T. THORNDIKE, *Secretary.*

SAGADAHOC AGRICULTURAL AND HORTICULTURAL
SOCIETY.

REPORT OF THE SECRETARY.

The Twelfth Annual Fair and Cattle Show of this Society was held upon the grounds of the Society, Topsham, October 9th, 10th and 11th, 1866. Tuesday, as usual, was devoted to the exhibition and examination of cattle, sheep, swine and poultry, also ploughing, all of which passed off satisfactorily, except the show of cattle, which was unusually small, not equal to any of our former exhibitions. We noticed many good pairs of oxen, and some fine cows and good young stock, by the most enterprising of our farmers, chiefly from the immediate neighborhood of the grounds. Of sheep we had a good show, much better than usual. Prominent among them was the South Down, the preferable breed in our locality for wool and mutton combined. Many coops of turkeys, geese and fowls, proving by the specimens presented that the raisers are alive to improvements.

We have within the bounds of our Society excellent specimens of oxen, and in large numbers, also as fine cows as are to be found elsewhere, although not so numerous, and we hope to be able to say that our next exhibition of live stock is the largest and best ever seen upon the grounds, and no earthly reason can be given why it should not be so.

Wednesday was the day for exhibition of horses; and this part of the exhibition showed that there was a good improvement from former shows. Unusual inducements were offered exhibitors of trotting horses, which brought out many of the fast nags from other parts of the state, and also a large gathering of people to witness the same. The track was in good condition. As fast time never was made upon the grounds before. We have now within the limits of this Society, owned by Messrs. J. & S. Sampson of Bowdoinham, a promising Knox stallion, an imported English and French stallion, owned by A. S. Perkins of Topsham, and a Young Flying Eaton stallion, owned by J. H. Alexander of Topsham. Our people are awake to improvement of horses, not only to horses for all work but also for speed.

The Society building was opened to-day to exhibitors, and here was seen a fine display of field crops, especially of corn, pumpkins and squashes, which was very fine; root crops in good variety, bountiful in quantity and monstrous in size; apples in large quantities and in great variety; pears scarce, but many good specimens; grapes of many kinds, chiefly raised in open air, and well ripened. And last but not least, the ladies of the Society displayed very extra specimens of household made fabrics of cotton and woollen goods, together with fine samples of needlework, products of their own hands during the past year, giving evidence that industrious and skilful habits have been steadily pursued by the few exhibitors, and ought to be by the many to their profit.

Thursday was spent in hearing reports from the awarding committees, and by short addresses from several gentlemen, that were listened to with eager attention, especially the addresses, which seemed to us as words fitly spoken; after which the ladies and gentlemen's equestrian exercises took place, closing the exhibition, with fine weather the whole time, with much larger attendance than usual, and consequently the gratifying result of much larger receipts, assisting us in reducing our Society's debt. We hope soon to be able to say that we are out of debt and are using receipts to improvement of agriculture and the arts by offering large premiums, and inducing more competition among farmers and mechanics.

We feel largely indebted to those who year after year make it a point to do something for the exhibition; but we have a large and fine building and it requires the labor of many to get up a good show. But many of our farmers are finding out that no better way for advertising any article they have to sell can be found than by exhibiting such articles at our Fair. And we have yet to find the mechanic or artist or merchant who will say that he has not received a great advantage by contributing to our exhibition commensurate with the efforts made. In conclusion, my conviction is that the influences of the Society are widely felt for good, and the interest in the exhibition by the public increase.

Amount of premiums offered, \$573; amount of premiums awarded, \$432.

ISAAC P. TEBBETTS, *Secretary*.

FRANKLIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Twenty-sixth Annual Show and Fair of the Franklin County Agricultural Society was held at their grounds in Farmington the 2d, 3d and 4th of October, 1866.

The weather was good on the opening day of the Show, and the exhibition of stock was better perhaps than ever before, plainly showing the influence of the Society upon our farmers, even upon those who are not members. Here were oxen girting eight feet, when at the formation of our Society seven feet was considered all our stock growers could hope for. This department was pronounced by good judges a decided success.

The Fair at the Hall opened on Wednesday, also the exhibition of horses. Although the weather was not what could be wished, the attendance was large and the exhibition good.

On Thursday, the last day, the weather was cold and windy, yet the number of people present was never larger, who listened to an excellent address by Dr. N. T. True, giving many valuable hints to all, especially to the farmer and mechanic.

The specimens of butter and cheese were excellent. The exhibition of fruit was large; we think the most ever on exhibition at our Hall. Maj. Loren Adams and others presented fine lots of grapes. Maj. S. Dill of Phillips was on hand with his cranberrys, for which he receives our thanks.

The exhibition of domestic manufactures and fancy articles was good, especially those of the useful, including all wool cloth, cotton and wool flannels, diaper, rugs and mats, &c. The opinion generally pervades that our Fair and Show passed off satisfactorily, and in all of its departments was a success.

Amount of premiums offered, \$339; amount of premiums awarded, \$250.

PETER P. TUTTS, *Secretary.*

NORTH FRANKLIN AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition, Show and Fair was held at Phillips, on Wednesday and Thursday, October 10th and 11th, 1866.

This Society now consists of about two hundred members. Its financial circumstances are steadily improving, and its influence for good increases every year.

Wednesday, the first day of the Exhibition, was assigned for show of horses, cattle, sheep and swine. The number of entries was larger than for several years. Neat stock continues to be a prominent feature of the Exhibition. The number of oxen entered was large. The prize for town team of oxen was awarded to Phillips. Stock and milch cows, bulls, steers and heifers were well represented.

Mr. Joshua Taft of Weld, entered one pair of yearling steers girting 6 feet, well matched and proportioned. The prize for town team of three years old steers was awarded to the town of Phillips; average girth 6 feet 4 inches. The second premium was awarded to the town of Avon; average girth 6 feet 2½ inches. The bulls exhibited were Grade-Durham, Devon and Hereford.

In the horse department twenty-five entries were made, and the specimens on exhibition fully justify the farmers of North Franklin in the pride which they display in exhibiting these animals.

The sheep department was poorly represented. This, by no means, is owing to a scarcity of sheep or lack of interest in this department; on the contrary, the interest in wool-growing was never greater than now, as the numbers of sheep and quality of the wool will amply testify.

In the crop department considerable interest was manifested in making entries, but at the meeting of the adjudging committee in December many failed to present statements and specimens. Mr. Mark G. Walker of Phillips, produced from one acre 144 bushels of ears of corn. Mr. James W. Butterfield of Phillips, produced from one-half acre 76 bushels. Mr. D. L. Harlow of Avon, raised from three and one-half acres 196 bushels well cleansed grain, 46½ bushels oats and peas, 149½ bushels clear oats; he also raised from

one-half acre 190 bushels potatoes. Mr. Harrison Beal of Avon, raised from one-half acre 177½ bushels potatoes. Mr. H. M. Butterfield of Phillips, produced from one-half acre 175 bushels.

There is quite an interest now felt among the farmers in this section in wheat-raising, those having tried the experiment being rewarded with bountiful crops, some raising as many as two hundred bushels.

The exhibition of fruit and vegetables was rather meagre; Maj. S. Dill, however, displayed a very palate-tempting variety of apples, grapes and cranberries.

Second Day. Address by E. D. Nash, Esq., of Phillips. Mr. N.'s address was an able and interesting production adapted to the occasion and wants of the Society.

The display of domestic manufactures, needlework, paintings, &c., was praiseworthy and did much credit to the ladies who support this department.

In conclusion we would remark that there is in this section a growing desire among both farmers and mechanics to be masters of their professions. This Society, we believe, in the fifteen years of its existence, has done much to the attainment of this end. Agriculture is the parent of all other arts; from it they derive their sustenance, their support, and as the parent, there are none but should do it homage. One of its chief supports are our Agricultural Societies, and as such are deserving of aid from every hand.

T. A. JOSELYN, *Secretary.*

EAST SOMERSET AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The East Somerset Agricultural Society held its Annual Exhibition in Hartland on the 11th and 12th of September, 1866.

The show of neat stock was not as large as in some preceding years, but was of very good quality. James Fuller of Hartland, exhibited full-blood Hereford and Jersey bulls. C. B. Stinchfield of St. Albans, had on exhibition a Jersey cow and heifer, which were good specimens of that breed. There were some very good oxen and steers of the Hereford breed.

The show of horses was larger than of any former year and of a better quality. There were some fine colts of the Drew breed.

The show of sheep and swine was small. Clement Goodwin of Hartland, had a fine flock of Spanish Merinos.

The exhibition of manufactured articles and dairy products was small, owing to the day being rainy.

The show of fruit and vegetables was not as large as some former years, the Show being too early in the season.

Amount of premiums offered, \$278 ; amount of premiums awarded, \$217.

THOMAS FULLER, *Secretary.*

WEST SOMERSET AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition of this Society was held on the Fair Ground, near Anson village on the 10th and 11th of October, 1866. The weather was fine and the attendance both days very large. Many noted farmers from distant parts of the State were present, and all conceded that the show of stock and sheep excelled any show ever held in Maine. The Maine Farmer was right when it predicted (beforehand) the best sheep show that could be got up in Maine.

There were on exhibition two hundred and eighty head of horned cattle, three hundred and fifty sheep, including bucks and lambs, thirty-five horses and colts, and some swine. The neat stock was mostly Durham, with a sprinkling of Herefords, Devons and Jerseys. The Durhams are the favorites of the farmers, who breed mostly for working oxen, and among whom can be found the best oxen in the State. The sheep are of the fine wool variety, nearly all Spanish Merino. The predominating breed of horses is not easy to determine; the finest animals, however, are of the Knox or Drew blood.

Liberal premiums were offered on field crops, but, though the crops have been generally good hereabouts, there were but two entries made,—one each on corn and wheat, the statements of which are forwarded herewith. For several years back our farmers have generally abandoned the cultivation of wheat; but the experience of the last two or three years shows very good results from what has been sowed, and another year we think will show a large increase in this direction. Wheat has been good in this locality this year; all other grain crops have been abundant, the corn of not quite so good quality as last year. Of potatoes there was a wide spread and an abundant crop.

The exhibition of dairy products, fruits and garden vegetables was unusually small, more attention being paid to raising fine animals than to making butter and cheese.

The department of household articles, domestic manufactures,

needle-work, fancy, &c., &c., was very well filled, showing an increased interest in the manufacture of domestic cloths, &c.

On the whole our Society has been very successful this year. We have succeeded in entirely liquidating the debt hanging over us and leaving a "shot in the locker" for further improvements.

Amount of premiums offered, \$282; amount of premiums awarded, \$254.

ALBERT MOORE, *Secretary*.

The corn was grown on green sward broke the fall before; the soil is rocky loam, had been mown five years; there was about five cords of barn manure applied to the hill, and had been thrown into the hog-yard the summer before. It was planted about the 20th of May; hoed twice. Before hoeing the first time I applied one handful to each hill of equal parts of lime, plaster and ashes. It was harvested about the first of October, and had one hundred and eighty-seven bushels of ears, weighing $37\frac{1}{2}$ lbs. to the bushel.

Cost.

Plowing ground,	\$3 00
Harrowing and applying manure,	3 00
Cultivating and hoeing twice,	4 00
Harvesting,	4 00
Cost of manure,	10 00
Total cost of crop,	\$24 00

Value.

Ninety-three and one-half bushels of corn,	\$140 00
Two loads of pumpkins,	3 00
One ton of fodder,	5 00
Manure left for future crops,	5 00
Total,	\$153 25
Deduct cost,	24 00
Profit,	\$129 25

T. F. BOOTHBY.

Embden, Oct. 25, 1866.

The mode of raising my wheat was as follows: Broke up the ground in the fall of 1864—one acre and a third. In the spring of 1865 hauled on fifteen loads of manure from the heap and harrowed

Until very recently, a confident expectation has been entertained of being able to present here a report of the progress of the State College of Agriculture and the Mechanic Arts from the pen of the President of the Board of its Trustees.

Although circumstances prevent its completion in time to appear in these pages, such a report may yet be expected during the early part of the session of the Legislature, and such being the case, there appears an obvious impropriety in any attempt on my part to anticipate its statements, views and recommendations.

No one who has followed the very able writer of the next preceding article in his presentation of the subject, can fail to perceive in some good degree, the novelty, the magnitude and the difficulty of the problem, the working out of which is put in charge of this Board of Trustees. To those who are impatient of delay, and desire speedy results, we respectfully suggest that the class of institutions called into existence by the act of Congress is wholly unique, that there are no precedents by which to be instructed, and that great danger exists of falling into errors more or less injurious; consequently it is the part of wisdom to exercise great caution and deliberation in the adoption of the means to be used to carry out the trust.

I will merely remark that in the early part of the past year the location at Orono, in Penobscot county, was decided upon, and that progress has been made on other points connected with the establishment of the Institution.

The operations of the County Agricultural Societies during the present year, have exhibited considerably more of energy and activity than was manifested during some years previous. This was naturally to be expected, for during the four or five preceding years the attention of all was so deeply engrossed by the tremendous struggle for self-preservation and liberty through which our beloved country was passing, so much of anxious thought and care was compelled to be given to matters related thereto, so much of sacrifice in varied forms was imperatively called for, that whatever else could, for the moment, be laid aside, must needs give place to the urgent demands of the hour.

Those years, however, have left a deep and broad mark upon agricultural progress in Maine. The necessity of obtaining food

for man and beast and means to meet the numberless calls, and this too with a diminished expenditure of human labor, led to the introduction and extensive employment of time-saving and labor-saving implements and machinery, and to greater skill in the numerous operations of husbandry.

Especially may the influence of these years be seen in the rapid extension and increase of sheep husbandry, and in the improvement of breeds of this invaluable domestic animal. This extension and improvement received great encouragement from the probability, and I may say, confident expectation, that the national requirements for revenue would insure a tariff upon wool which would yield a steady and sufficient protection to the home grower, so as to enable him to compete with production in those more favored foreign countries where neither shelter nor harvesting and housing of food for half the year are required. I regret to learn that doubts are entertained whether such a tariff may be adopted; and this not merely because the failure to secure a protective duty upon foreign wool would result in the sinking of a large amount of capital invested by the farmers of Maine; but also, because sheep husbandry is so valuable an agency for the elevation of agriculture in a country of moderate natural fertility like ours, that it can hardly be dispensed with and success attained by other means.

By the agency of the sheep, a great amount of herbage, of a quality which would serve but poorly for any other domestic animal, is readily converted into good meat and wool and manure; and thus we are at once furnished with food and the material for raiment, and with means of fertilization which will insure an increase of food in years to come.

Let the price of wool be so reduced that the farmer becomes constrained to discard the sheep, and it is easy to see that great loss, both direct and indirect, must ensue. What can be more reasonable than the demand, that, in levying the burdens which must be borne, they be so adjusted as to yield all the advantages which the nature of the case admits? I cannot relinquish the hope that such will be the fact, and that adequate protection will be steadily continued for many years to come.

S. L. GOODALE,

Secretary of the Board of Agriculture.

JANUARY, 1867.

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BRAHMA FOWLS---TAKEN FROM LIFE.
Stock of H. G. White, South Framingham, Mass.

ABSTRACT OF RETURNS

FROM THE

AGRICULTURAL SOCIETIES

OF

M A I N E .

1866.

**EDITED BY
STEPHEN L. GOODALE,
SECRETARY OF BOARD OF AGRICULTURE.**

**AUGUSTA:
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ANDROSCOGGIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

I herewith transmit a statement of the success and doings of this Society for the year 1866.

The Annual Show and Fair was held at Lewiston, October 2d and 3d. The weather and travelling were excellent, and we had one of the best exhibitions held since the organization of the Society, both as regards the show of stock and the display of manufactured articles.

The receipts of the Society were less than last year, but the expenditures being less, the balance will show as favorably as then.

The hay crop of this county is less than last year, probably not exceeding in quantity three-fourths of the preceding crop, but the quality has never been surpassed.

The season was very favorable for the growth of the potato, and an abundant crop has been secured.

The corn crop has been very good, both in quantity and quality.

Wheat yielded fairly, though there was but little sown. Owing to the elements of production that were stored up by the soil when first brought into a state of cultivation having been exhausted, and the necessary compensations not having been given to it, this valuable crop has ceased to be of any great comparative value in this section.

The barley and oat crops were large and rarely excelled.

Nature has been more lavish with regard to the fruit crop the present year than the preceding, yielding the farmers of this county an abundant harvest.

There were ninety entries of neat stock "presenting, by general consent, the finest show of the kind ever exhibited on the Society's grounds."

Four town teams of oxen, of twelve yokes and over, were entered. These teams were made up of some of the finest oxen that have ever been exhibited, showing that there has been a decided improvement in the breed of these animals.

Two town teams of steers, of eight yokes and over, were also entered. They were fine looking and well built.

The exhibition of milch cows was good, there being twelve entries. Mr. Rollins of Lewiston entered a valuable grade Jersey cow and calf. He stated that from the milk of the cow two hundred and seventy-two pounds of butter were made in six months, and eleven pounds during the week preceding the Show.

Sixteen bulls were on exhibition, all fine animals. The Jersey bull entered by H. H. Dickey was one of the best we have ever seen.

The exhibition of sheep, swine and poultry was good. It is evident that since the close of the war the rearing of sheep has received less attention than during its progress.

There were fifty-four horses and colts on the grounds. Many of them were very fine animals, giving evidence of superior breeding, and that much attention has been paid to this branch of stock growing.

The exhibition of dairy products was worthy of regard, there being forty-seven entries of bread, butter and cheese, all of which were of superior excellence.

The entries of household manufactures were larger in number than last year, showing that the ladies were much in advance of the "lords of creation" in their contributions to the exhibition. A very commendable spirit of rivalry was manifested from old and young in the manufacture of articles for domestic use, entries having been made by ladies of eighty and misses of five, nine and eleven years, all of which discovered commendable skill; and from examination we became convinced that if any lack of interest is ever manifested in our County Fair it will not be chargeable to the ladies who fill this department.

The manufactured goods exhibited by N. W. Farwell, from their beauty and finish called forth general commendation, and contributed greatly to the attraction of the Fair.

The show of fruit was good in quality but deficient in quantity. Several superior varieties of apples were shown. Mr. Thomas Herbert of Bristol, Lincoln county, exhibited eleven varieties of pears, all of fine quality and adapted to this State.

There was a good display of agricultural implements. Messrs. O. E. Randall, John N. Wood and W. W. Wood exhibited the admirable horse-rake patented by Mr. Randall in 1865. This is regarded as the best horse-rake in the market.

Potter & Thompson exhibited several of their splendid carriages.

Our Show and Fair the present year, as a whole, fully realized our anticipations, and proved that the farmers *do* derive benefit from these yearly gatherings; but we wish to see still more unanimity, more interest and more zeal in behalf of this Society, in order to promote their own welfare.

Amount of premiums offered, \$558; amount of premiums awarded, \$411.

NELSON HAM, *Secretary*.

AROOSTOOK COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

I transmit with this our annual statement of "financial condition and doings." We do not show so large a sum of money raised this year as last, but we have been prospered during the year, and our Cattle Show in September was much superior to the first one, held a year before.

The Society has already excited new interest among the farmers, and a Farmer's Club was started last winter in West Houlton, a direct outgrowth of the Society's influence. I hope the example set by the Hancock County Society may be adopted by our own, and that we shall have those public discussions, which must be so very beneficial to all who attend.

I had hoped to make quite a lengthened report this year upon some topics of local interest, and compare our condition, as regards facility of production and cost of same, with older parts of the State. The brief time now at my command forbids much attention to these things. I have been very busy in setting up a "Beater Hay Press" the last few weeks, and its relations to our agricultural interests are so intimate that I speak of the matter in this Report.

We can easily produce excessive crops of hay in our fertile, easily-worked fields; but up to this time there has been no cash market for it. Stimulated to the experiment by the near approach of good railroad connections with Calais and St. Stephen, we have set up the press, and believe we shall build up a good business.

There is danger that heedless men may sell hay to the injury of their farms, but our lands are so productive that we may well sell a good deal of this most valuable commodity.

Our Annual Address this year was delivered by Hon. P. Barnes of Portland. It set our farmers to thinking, and I notice that many are carrying its theory into practice this fall. (See page 99 of Report on autumn cultivation.)

I am satisfied that to prepare the ground in the fall is the true way of doing the work, and in so doing we but make the best use of nature's coöperation in the work of producing food for man and beast.

I hope another year to be more at leisure to enter into matters of interest to ourselves and others seeking information about the advantages and capabilities of Aroostook county.

Amount of premiums offered, \$266; amount of premiums awarded, \$134.

FRANCIS BARNES, *Secretary*.

CUMBERLAND COUNTY AGRICULTURAL SOCIETY.

This Society had made due preparations to hold its Annual Fair in Portland, but the great fire of July 4th and 5th prevented the arrangements from being carried out, and none was held.

PORTLAND HORTICULTURAL SOCIETY.

This active and efficient Society, notwithstanding the total destruction of its flower stands, cases, glass ware, vases and other furniture, held an autumnal Show, which was as successful as the unusually limited accommodations at their command would permit.

Amount offered, \$347; amount awarded, \$233.

HANCOCK AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Of our Society I am able to make a favorable report. It has been in operation nine years, and numbers some five hundred members. It has gradually progressed from a small beginning—having but thirty-seven members at the date of its organization—meeting and overcoming the obstacles in its progress with a steady perseverance. Opposition is gradually dying out, “and the few left will be laid aside soon, like fossils in the new alluvia now forming.”

Very few county agricultural societies can show a better financial condition. The balance due upon the land is now quite small, and the prospect is good that we shall soon be free from debt.

We have a large fair ground fenced and suitable buildings thereon.

Its Ninth Annual Fair continued through three days. Although the weather was for the greater part of the time very unfavorable, the Exhibition was the largest and best ever held under the auspices of the Society. While the old competitors, farmers and farmer's wives, were present with their stock, and specimens of handiwork, many new faces were to be seen in the jostling crowd. Nearly every one seemed good-natured, interested and pleased. The listless lookers-on, and the *wet blanket* men, will soon only be known in antiquated history.

The number of entries far exceeded that of any preceding year.

The benign influences of the Society are seen, felt and acknowledged, not only within the entire circle of which it is the centre, but diffused over the face of the entire county. It is to be seen in better stock, improved farms and larger crops. The improvement in our stock is very manifest. We have, as yet, but few “Herd Book” animals, but such as we have are excellent representatives of their class. Of grades, no county has, we think, excelled us in the same period of time. Nine years ago, at the date of the organization of the Society, not a pure bred animal was known, as such, within the limits of the county.

The old proverb “every crow thinks its own young the whitest,” was universally adopted; each owner looked upon his *own* “na-

tives" as the best cattle in the county. These annual gatherings have disabused the farmers of such faulty ideas, and substituted both a demand for and a supply of known valuable stock. There is yet a wide margin for improvements, but in view of the progress already made is hope for a brighter future. The good work thus begun cannot "breed back" again.

The samples of farm products displayed far exceeded in value and number those of any former year, with the exception of corn. The wet season made this crop a failure.

Perhaps no one cultivated crop has received such an impetus, and the culture of which affords such ample returns, as that of the cranberry. For the first few years only now and then a solitary claimant for the exceedingly liberal premiums to encourage its cultivation; now there are more exhibitors and competitors for the premiums offered for cranberries than for any other field crop; and every year is adding its quota to the list of successful producers.

Last year, for the first time, premiums were offered "on farms," the awards to be made at the close of the third year. Thirteen were entered, which has stirred up a very commendable spirit of rivalry.

This year we are attempting the experiment of agricultural discussions, under the auspices of the Trustees, with what success remains to be seen.

That our Society is still advancing in its usefulness is evident to all, by the introduction and rearing of the improved breeds of domestic animals, the more thorough cultivation of the soil, the introduction of improved implements of husbandry, and the different varieties of roots, grain and fruit. We are better prepared to meet the wants of all, and inspire confidence in our ability to secure greater results from our future labors.

Amount of premiums offered, \$1061; amount of premiums awarded, \$788.

SAMUEL WASSON, *Secretary.*

Ellsworth, Nov. 30, 1866.

KENNEBEC COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Another year has passed, and we are to report what has been presented to us from the Giver of all our blessings.

Never since our recollection has there been a season when the labors of the husbandman in this section have been more signally blessed. The season for putting the seed into the ground was unusually favorable. In most cases the blade soon appeared, in a few instances, however, the weather proved too dry or the planting too shallow, but there was hardly a single piece of land that did not produce the desired crop. Then the hoeing and harvesting seasons were equally favorable, especially for the hay crop, which has been pronounced to be, by many competent judges, equal to that of last year, although not so much in bulk, yet in weight and quality enough better to make it equal, or even better.

The apple crop has been equal to the most insatiate desire of the farmer, and the prices have been such that the avarice of many has tempted them to palm off on the buyer, as fruit of the first quality, apples that had it not been for their own mark, which they were obliged to place on their barrels, they would have denied as ever having come from their orchards, and would denounce the man that would offer such fruit for sale as wanting in common *honesty* (and this would be a mild term). Probably there never has been as much money brought in this county in one season before for this one product.

The cranberry is also receiving some attention. Mr. Isaac Foster of Winthrop has a small patch of land which a few years ago produced nothing but alders and some coarse swamp grass, this year yielded him about thirty bushels of very nice cranberries, equal to any that are brought into our market from other States. These gave him a very large profit on all his outlay. Others are following his example, and I doubt not will meet with good success.

Our Show and Fair was all that we could reasonably ask it to be. The weather delightful, attendance good, entries and exhibition of almost everything within our limits, except milch cows, truly commendable. The show of oxen was never equalled before

at any of our exhibitions. It was estimated by the Committee that there were over twenty thousand dollars (\$20,000) worth of oxen present.

The prize for the best working oxen was strongly contested, and excited much interest.

There were a few good milch cows present, but the excuse of the dairyman is, that no premium can be offered by any County Agricultural Society that will compensate him for driving his best cows to the Show. How far this is true I will not pretend to say. Good cows are not likely to be benefited much by being driven from home, I will admit; yet, there are some who look a little beyond present self-interest.

The show in the dairy products, particularly in butter, was excellent, never better; at the close much was sold for large prices. The cheese was thought by some not to be quite equal to that of former years, yet very fair.

The ladies department of household manufactures was in many respects truly superb. The really useful articles, such as quilts, blankets, socks, hose, mittens, &c., &c., were there in great abundance, and the ornamental kept pace with the useful.

The department of fruits and flowers was never excelled—the flowers never equalled at any Show of ours for their number, variety and perfection, which attracted much attention, and added much to the beauty.

The Address before the Society, delivered by W. B. Snell, Esq., Preceptor of Monmouth Academy, was full of interest and eloquence. It was listened to by a large and appreciative audience. The singing was by a choir from Fayette, led by F. A. Chase, Esq., which gave much interest to the occasion.

The Society was never more prosperous than at present—peace and harmony existing to a greater extent than it is the common lot of agricultural societies to enjoy.

We are out of debt, and have a small sum in our treasury. Our land is leased for a term of years, and enclosed with a good tight fence, having a trotting-park one half mile in length. Also a substantial Show Building, with suitable rooms for Secretary, &c., not yet owned by the Society, but which probably soon will be.

Amount of premiums offered, \$408; amount of premiums awarded, \$309.

DAVID CARGILL, *Secretary.*

NORTH KENNEBEC AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The show of live stock this year was unquestionably the largest and best we ever had ; while the exhibition at the Hall was, on the whole, very satisfactory ; for, although some of its departments were but sparsely supplied, others were full to overflowing. The attendance, however was smaller than last year, and although as many membership tickets were sold, yet the receipts fell off about fifty dollars. This was the result of two causes : 1st. The pleasant weather with which we were favored, followed a long period of rain, and farmers felt it their duty to improve it at home in securing their crops ; and 2d. There were three agricultural exhibitions in the county ; one in Skowhegan, and a town show in China, in our immediate vicinity on the first day. If the arrangement of these exhibitions are measurably within the control of the Secretary of the Board of Agriculture, it would seem to be demanded of him that he should interfere to prevent a conjunction so undesirable, in the future.* Many persons would be glad to attend each of these three exhibitions, who, with the existing arrangement, find it impossible to be present at more than one. The time of holding our show has been the same ever since the organization of the society, and latterly the other societies have selected the same week.

All departments of live stock were unusually full, and the improvement in quality, as compared with our earlier exhibitions, furnished gratifying evidence of the usefulness of our organization. The number of horses, in all the classes, fell but little short of a hundred ; and the most pleasing feature of this department, (characterizing other departments, also,) was the superiority of the young over the old. A great advance has been made in this interest throughout the whole State, and in no part of it are good horses and promising colts plentier than in the valley of the Kennebec.

* It is in no measure under the control either of the Secretary alone, or of the Board of Agriculture as a whole. The matter has been agitated at several sessions, but upon a full comparison of views, action was deemed inexpedient by a majority of the members.

The display of neat stock was also a triumph in number and quality. Six competitors, Samuel Taylor, Warren Percival, Geo. Rice, Henry Taylor, H. C. Burleigh and Wm. Nowell, entered the lists for the herd premiums, bringing, in the aggregate, eighty-six animals, ranging from thorough-bred to native. Mr. Percival's twenty-eight choice Durhams, all herd-book animals, made no small exhibition by themselves, and were highly creditable to the enterprise of this well-known stock grower; but we fear that the merits of his stock were not fully appreciated by all the committees to whom they were submitted. The number of thorough-bred bulls on the ground was large, with many fine grade animals; and the long rows of noble oxen made a gratifying sight. The show of cows was superior to any former exhibition, and included several choice Jerseys, which continue to grow in favor. The Heifers numbered forty-two, and gave evidence that an abundance of good cows are growing, and that butter ought to be cheaper at some time.

The number of sheep was double that of any former show; and we think there has been a greater growth and concentration of interest in this department than in any other within the province of the Society. As evidence of this, may be mentioned the organization of the "North Kennebec Wool Growers' Association," which commenced active operations last Spring, with a remarkably interesting and successful sheep-shearing festival at Waterville. The advent of the "Green Mountain Boy," too,—a choice thorough-bred Merino buck, brought here by Eph. Maxham, the equal of which, considering his age, build, fleece, and stock-getting properties, was probably not left in Vermont, his native State—has given a wonderful start to the sheep fever in this section. This animal was present at the exhibition, with several of the noted "Ladd Bucks," from New Sharon, and other choice specimens. George Richardson & Son, John Athearn, A. G. Ricker and Dr. N. R. Boutelle, presented flocks of choice Merinoes; Joseph Percival and George W. Hubbard, competed in coarse wools; Mr. H. G. Abbott was present with his large and choice flock of medium wools, which were admired by all who saw them. The grade of sheep which he thinks he has established, is that happy medium that just fills the eye of a large majority of our farmers.

The show of swine was unusually large, and embraced specimens of Suffolks, Chesters, Prince Alberts, and two Province shotes, presented by W. A. P. Dillingham.

In the Poultry department, too, there were large numbers of choice representatives of all classes, and a very interesting exhibition.

The Fair at the Hall, which opened as usual, on Tuesday evening with a pleasant social gathering, enlivened by music from Mrs. H. Taylor, Mrs. L. A. Dow, Miss Lucy Carroll, Miss Abby M. Hawes, and others, was one of which we had no reason to feel ashamed. To be sure, the supply of domestic manufactures, though fair, was not large; but the full display of fruit, dairy products, samples of crops, fine arts, miscellaneous articles, etc., made ample amends; and the display of farm implements by Messrs. W. A. P. Dillingham and Joseph Percival, was such as never greeted the eyes of visitors at any previous exhibition.

The central point of attraction in the Hall, was a large table of agricultural products, from the farm and garden of Hon. W. A. P. Dillingham, which of itself would have saved the exhibition from failure. It embraced fine samples of wheat, corn, pumpkins, squashes, three varieties of potatoes, four of beets, cabbages, carrots, eleven kinds of choice apples, five of grapes, tomatoes, jars of butter, several bouquets of cut flowers, etc. In addition to a liberal gratuity, the Society very properly tendered him their hearty thanks for this large contribution.

The contributors to the Fruit department, included those original members and early supporters of the Society, the brothers Taylor, Samuel and Joseph, Hiram Cornferth, Stephen Nichols, W. A. P. Dillingham, George Richardson, Galen Hoxie; and last, but not least, though ruling over a small village garden, Lemuel Dunbar.

The department of Fine Arts, embraced many rare gems of beauty, prominent among which may be mentioned the large collection of photographs, presented by Mr. O. J. Pierce, of Waterville; many of which are faithful copies of pictures and statues that have a world-wide reputation. By the introduction of these gems of art into the homes of the people, he is doing much to elevate and refine society, and to a certain extent, should be regarded as a public benefactor and encouraged and rewarded accordingly.

Of the numerous articles in the Miscellaneous department, many of which were curious and interesting, we will mention only two contributions,—a collection of insects made by Master Edson F. Hitchings, and a rustic chair and sofa, constructed from the twisted roots of trees, by Joseph Taylor of Belgrade. The sculptor, who

in a rough block of marble, sees an angel, is pronounced a genius; and it must have been something akin to the divine quality of mind and soul possessed by the true artist, that enabled friend Taylor to see these beautiful and curious pieces of furniture in the tangled maze of roots, with no form nor comeliness to a man less gifted to discover beauty and harmony everywhere. They excited the wonder and admiration of all beholders, as rare products of mechanical genius, artistic taste, and patient labor; and the committee very fittingly awarded to them a copy of Whittier's poems, which we know the recipients will prize much beyond its value in money.

The Trustees having fixed the premiums on a very liberal scale this year, and there being a falling off in the attendance, our receipts are not sufficient to meet the awards and incidental expenses by a little over a hundred dollars; but we have no debt to provide for, and there is money enough in the treasury to satisfy all lawful demands upon it.

This year, as in former years, we have had trouble in filling our committees with the right kind of men, who, with proper notice of their appointment, would come prepared with carefully considered and well digested thoughts bearing upon the particular department assigned them, the presentation of which, on the last day of the exhibition would furnish a very good substitute for a set address. Those originally appointed and notified, too often fail to appear, and their places are filled at short notice by others, who are not prepared, even if they possess the proper qualifications for the labor thrust upon them with so short notice. As a consequence, therefore, many of the reports are very meagre, containing little beyond the bare awards, with no adequate notice of the animals or articles submitted to their inspection, while those which fail to take a premium are too frequently ignored altogether. To this, however, we are pleased to say, there are honorable exceptions in men who have served the Society faithfully and conscientiously, year after year, with no reward but the gratifying consciousness of performing their duty. May they long be spared to bless the Society; and let us pray for more like them, to labor by their side and to fill their place when they shall be called hence.

Amount of premiums offered, \$675. Amount of premiums awarded, \$466.

DANIEL R. WING, *Secretary.*

KENNEBEC UNION AGRICULTURAL AND HORTICULTURAL SOCIETY.

From the Secretary, Mr. S. Smiley, we have the following :

The Kennebec Union Agricultural and Horticultural Society held its Annual Cattle Show and Fair at Gardiner, Oct. 2d and 3d, A. D. 1866.

The weather was favorable, and the display of manufactures and fruit was as large as has been made by the Society for the past three years.

The number of cattle, horses, sheep and swine was not so great as should have been exhibited by this Society.

Amount of premiums offered, \$575; amount of premiums awarded, \$353.

The following statement of remarkable yield of a cow is from the pen of Nathan Foster, and is quoted from the report of a Committee of which he was chairman :

The writer of this report, without consultation with the other members of the Committee, append the statement of Mr. Benjamin Lawrence of Gardiner, in relation to his cow, which carried the Society's first prize last year. She being lame was not present this year. The cow was ten years old last spring, dropped her calf late in April, and in seventeen weeks, commencing the 5th of May, were made from her milk 210½ pounds of butter, a family of four persons being liberally supplied with milk and cream during the time from the same cow—being a fraction over 1 lb. 12 oz. per day. In seventeen days in June 46 lbs. of butter were produced—2 lbs. 11 oz. and a fraction per day.

Her keeping after turning to pasture in the spring was pasturage only, till within the last three weeks six quarts of coarse shorts have been added daily. She is now giving sixteen quarts of milk, beer measure, per day.

This cow when exhibited last year was represented to be a grade Jersey, Mr. Lawrence believing her to be so. In conversation with him recently I learn her dam was driven by himself to Mr. Gardiner's farm for this calf. At that time (eleven years ago) the farm was under my care, and the only animal for that kind of service on the farm was a half blood Ayrshire, from my grade

Durham cow, which I kept till twenty years old. For the production of butter I have no recollection of seeing the cow, or a reliable statement of one, the equal of this in the county or the State. Mr. Boutelle of Waterville exhibited at the North Kennebec Show, some years ago, a full blood Ayrshire, a much smaller cow than this, which had given twenty-one pounds of butter in seven days. But one and three-fourths pounds of butter per day, for one hundred and nineteen days, and still giving milk enough to continue the same quantity longer, is "hard to beat."

LINCOLN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Fair of our Society was held at Waldoboro' Oct. 3d, 4th and 5th, and was well attended. Our show of stock was not large, but of good quality for this locality, especially the young stock. The same remark applies to horses and colts. A gradual improvement has been going on in these departments for some years.

Our show of grain and root crops was superior to that of any previous year. Our samples of corn were very fine, quite a number of large crops, well ripened, having been raised in this vicinity.

Of fruit there was a large quantity and in excellent condition. This department is one of the main and most attractive features of our indoor exhibitions.

Our Exhibition the present year we think fully up, and in some departments superior, to any previous Fair of this Society.

Amount of premiums offered, \$650; amount of premiums awarded, \$488.

C. C. ATWELL, *Secretary.*

OXFORD COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The twenty-fourth Annual Show and Fair of this Society was held Oct. 9th, 10th and 11th, 1866. The weather was favorable, and the number of visitors large. The exhibition of stock-horses, trotting-horses, mares and horses and colts was large, there being fifty-six entries, embracing many fine specimens. The trotting was spirited, and appeared to interest a large crowd of visitors. The entries for neat stock were numerous, embracing twenty yokes of working-oxen, two herds, three town teams, and a number of bulls, steers, cows and heifers. The exhibition of neat stock constitutes an important part of our Shows. The number of sheep entered was small. No swine were exhibited. The display of dairy products, although not large, contained some very nice specimens of both butter and cheese. The present high prices of the products of the dairy ought to be a sufficient inducement to our farmers to enlarge their operations in this department. The competition for premiums on field crops is not what the importance of the subjects requires. Applicants for premiums on crops frequently make entries at the time of the fair, but neglect to make the subsequent statements required by law. O. H. Durell of Paris raised 50½ bushels of excellent wheat on two acres, and William Frost, Jr., of Norway raised 240 bushels of ears of corn on one acre. An abundant crop of corn has been harvested in this vicinity the present fall, and though not so fully matured as the crop of 1865, still the average quality is good. The wheat crop was better than it has been for many years. The exhibition of fruit was large and the quality good. Uriah H. Upton of Norway presented thirty-one varieties of winter and twenty-two varieties of fall fruit. William R. Swan of Paris presented twelve varieties of winter and eight varieties of fall fruit. In addition to apples, specimens of pears, grapes, plums and cranberries were presented. Numerous specimens of vegetables were exhibited, among them a squash by Rev. Ransom Dunham of Bryant's Pond, which weighed 195 pounds. The display of domestic manufactures was not so large as at some previous Shows, but some nice

specimens were to be seen. Some good articles of agricultural implements, such as plows, horse-hoes and horse hay rakes, were entered, besides a large number of smaller articles. Fifty-four entries were made under the head of miscellaneous. On the whole, our Show of the present year has been a successful one.

Amount of premiums offered, \$278; amount of premiums awarded, \$263.

ELLIOT SMITH, *Secretary.*

WEST, OXFORD AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Sixteenth Annual Exhibition of this Society was held at their grounds in Fryeburg, Oct. 9th, 10th and 11th. The weather was favorable, and as many, or perhaps more, were in attendance than any year preceding, as the receipts were larger.

There were on exhibition not as many live animals as have been presented at some former Fairs, but the quality suffered no depreciation. The amount of premiums offered by the Society for horses was \$57.50; the amount awarded \$29.00. The amount offered for neat stock, \$115.75; the amount awarded, \$46.50. This falling off is certainly not owing to any diminution in number of good animals within its limits. Horses are owned hereabouts for which \$1500 is said to have been refused, and within sight of their grounds an ox team of ten or a dozen yokes, all above seven feet, could have been collected, and yet neither were present.

Dairy products appeared in abundance and merit. Sixteen dollars were awarded in this department.

The housewives and the ladies in general filled the hall with generous displays of articles of domestic and fancy manufacture. This has always been a prominent feature in our Fairs, and may it not depreciate in future. The high prices of woollen and cotton fabrics have stimulated many to ply the wheel and the loom anew, and not a few of the younger members have learned for the first time what music there is in their hum, and economy and comfort in their products.

Fruit was never presented in more pleasing variety. One man exhibited nearly sixty varieties of apples, several of pears and

grapes, and other exhibitors equalled him in quality if not in numbers. Many are paying particular attention to their fruit trees, and no doubt will find it highly promotive of enjoyment, economy and health.

The maple, too, must not be left out of consideration. There are within the limits of this Society thousands and thousands of trees which yield annually more syrup and sugar than we believe can be offered by any other society. Some splendid samples were exhibited, much of the sugar appearing almost as white as the refined sugars of the market, yet we think a large portion of that delicious flavor is extracted by such thorough bleaching.

In making the abstract more general, we may add that the labors of the husbandman for the past year in this region have been pretty liberally rewarded in an abundant harvest. Most of the leading crops were above the average, if perhaps we except hay. This, owing to previous dry seasons, winter-killing, and last, though by no means least, the destructive influence of myriads of grasshoppers, was somewhat of a failure. Much that was gathered was poorly prepared for the barn, owing to the continued falling weather throughout the season. Mowing and raking machines are numerous used, there being about one hundred of the former owned and used in the town of Fryeburg alone. Some other towns are not quite so favorably situated for its general introduction.

Of corn, next in importance, there was a good crop, though not up to the expectations of the farmers earlier in the season. A cold and wet September interfered materially with its full development.

Potatoes were exceedingly good in quality and quantity. The horse-hoe is being somewhat introduced now in their culture, as well as corn.

Grain abundant, but little wheat, however, has been sown for a number of years, the main crops being oats and rye.

The prices of all products of the farm are yet in high figures, notwithstanding their abundance, and we can see no reason why farmers are not a happy and prosperous people, unless, indeed, it be just now they suffer from undue plethora of purse.

But after all the abundance the earth yieldeth and the yeoman's thrift, there is a hesitancy, a lack of interest in them to bring such forward and compete for premiums. Perhaps the premiums are

not *large* enough to satisfy them. If the object is a *great gain*, certainly they are not. Most societies in their infancy struggle with a load of debt, and can ill afford to make an attractive premium list. This has been the case with this organization; but we are now in a better financial condition—out of debt. We have therefore revised and raised the premiums, and shall, as further prosperity allows, offer still larger inducements. Shall try the experiment of holding the next exhibition for two days instead of three; and we hope that our present prosperity may be only a dawn, which will grow to a glorious noontide.

Amount of premiums offered, \$364; amount of premiums awarded, \$223.

D. LOWELL LAMSON, *Secretary*.

EAST OXFORD AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

Our Sixth Annual Exhibition was held at Canton. The morning of the first day was occupied by a business meeting of the Society, for the choice of officers, etc. The exhibition of neat stock and sheep, examination of the same by committees, plowing and drawing match, occupied the remainder of the day. The number of working oxen entered was large, many of which were of superior quality. The town teams from Livermore, Hartford and Canton, were splendid. Beef cattle and steers were well represented; of cows and heifers the exhibition was not so good, though the high price of butter and cheese would seem to be a sufficient inducement for farmers to give particular attention to the improvement of dairy stock. There was a better exhibition in the sheep department than usual, though small yet. We have not given so much attention to the raising of sheep in this section as in many other sections of this State, but the interest in this department is on the increase, and quite a number of improved breeds of bucks were exhibited. Two teams plowed with good success, and gave general satisfaction. The drawing, with oxen, of a large load of stone on a drag, attracted considerable attention, especially a class of curiosity seekers, but by the more candid persons this practice is

looked upon unfavorably. Would it not be better to give this attention to the best disciplined oxen, that would do the usual work of the farm in the most quiet and best manner, and not grant a premium to him who by the utmost possible exhibition of nerve of himself and oxen could barely start the most load?

The exhibition of horses and colts, of which there was a fair show, came off the morning of the second day. The Society and citizens met at 11 o'clock, to hear the Agricultural Address, by Albion Thorn, Esq., of Canton, which was able and instructive. There appears to be a lack of interest in the department of grain, roots, etc., so that we get but very few applications for premiums on corn and grain, or roots. I have thought that our Society does not offer that inducement for competition in this department that it should. If our farmers would take to the Exhibition more samples of their products, without thinking that they must be the very best, so as to take the *premium*, as though this was the sole object—but would rather present them to increase the interest of the exhibition, and to give a greater variety, to aid in forming an opinion as to the best variety for a certain location. The exhibition of butter and cheese was good. The display of apples, pears and grapes, was creditable. The importance of fruit raising does not appear to be sufficiently appreciated. We do not give that care and attention to the nursery and orchard that our interest demands. The display of vegetables, agricultural implements, domestic manufactures, needle work, etc., was good and interesting.

The crop of hay was generally rather light, though of good quality. Corn, about an average crop. Wheat has not been so good for many years. Potatoes, a fair crop. Oats, fair. Hops are raised to considerable extent in this section, but the crop was very light this year, in consequence of being badly winter killed last winter, and also from the effects of lice.

Amount of premiums offered, \$182; amount of premiums awarded, \$124.

WM. K. GREEN, *Secretary*.

PISCATAQUIS AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Piscataquis Agricultural Society held its Annual Exhibition at the trotting park in Foxcroft, Oct. 3d and 4th. It was the most successful exhibition ever held by this Society. One hundred and fifty new members were added to the Society. There was a large amount of neat stock on exhibition, especially oxen and steers; and a finer lot of large, well-formed cattle are seldom seen together. This is due, in a great measure, to the Short-horn bull, brought into the county by William Downs, of Dover. Although a grade claiming to be three-fourths Durham, one-fourth Hereford, his stock is almost faultless. He was sent to the shambles some two years ago, and we presume his stock will soon be extinct, as but few heifers were raised from him, and most of those shared the same fate before two years old. We seldom see bulls at our cattle fairs over three years old; so that by the time one is known as a good stock-getter he has been destroyed. It would be well to offer large premiums for bulls four years old and over, as it is generally acknowledged by breeders, that stock from mature animals is much better.

There was a good exhibition of horses, and especially of colts; showing that there is a marked improvement going on in the rearing of this noble animal. Farm stocks were well represented, and show that progress is being made in the right direction. Crops of all kinds are unusually good. Of hay we have full an average, although grass was badly winter-killed. Frequent showers in the spring and copious rains later in the season, caused resuscitation that gave us a bountiful crop of very fine, good hay, when not damaged by the weather. Although some of it was very late cut, it was of fine quality; most of it remaining green until the last of August. Wheat has done very well. There was but one entry for premium, that for 27 bushels per acre, which we think is not much above the average crop for the last four years would warrant; especially when we take into consideration its superiority as a crop to seed grass with. Other crops of grain are a full average.

Potatoes, which are our leading crop for feeding purposes, have yielded largely. Premiums were awarded for 382, 374, 251 bushels per acre, all of the Orono variety. Corn, premium crops were 91, 79, 59½ bushels of ears per half acre. There is an improvement in all the branches of farming. Farmers are beginning to think, and read. The consequence is, better management of stock, better tillage, and more permanent improvement. Much of this waking up is due to agricultural societies.

Amount of premiums offered, \$236; amount of premiums awarded, \$116.

PHINEAS M. JEFFERDS, *Secretary*.

NORTH PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

This Society, consisting at this time, of 290 members, held its fifteenth Annual Exhibition at Lincoln Village, October 3d and 4th. The attendance was large, and more than usual interest was manifested.

The entries of horned cattle, were 103 in number; of horses, mares and colts, 68.

A new and interesting feature was the presentation of entire herds of cattle.

Among the horses, beside other choice animals, was the celebrated Knox colt, owned by John A. Eames, of Passadumkeag, which took the first premium. There was also a good show of sheep and swine.

At the Hall was a very credible exhibition of domestic manufactures, dairy products, fruits and fancy articles, and more extensive than usual.

Among the premium crops were wheat by J. C. Emerson of Lincoln, 33½ bushels per acre; also 24 bushels by Samuel Hall of Lincoln.

Barley, 50 bushels per acre, by Mr. Hall, and 45 bushels by Mr. Emerson.

Potatoes, 288 bushels on one acre, by Horace Brown of Carroll, Oats, 56 bushels per acre, by George W. Thayer of Chester.

Indian corn, 80 bushels ears on half an acre, by Shepard Bean of Lee; 71½ bushels ears by William R Hersey of Lincoln.

To A. J. Heald was awarded a premium for largest product on one farm (excepting hay), being for corn, wheat, barley, oats and peas, beans, potatoes and pumpkins, grown on twelve acres, and estimated by the Committee to be worth \$840.50.

The hay crop was very heavy, although much reduced in value by continued rains during nearly all haying time.

Indian corn was good on dry soil, but on land naturally wet almost a failure.

Potatoes, great growth of tops, but being struck with the rust did not mature as last year. Reduced by rot from ten to fifty per cent. Quality bad.

Wheat, a better crop than for several years past, some raising as high as forty bushels per acre. Benjamin Whittier of Lee raised twenty-two bushels from one-half acre.

Oats, a great yield, and heavy.

Barley, very good.

Buckwheat, not much raised.

Beans, a fine crop, though somewhat injured by rust. C. House & Son of Lee have raised the present season over one hundred bushels good ones, worth from \$2.75 to \$3.25 per bushel.

Improvements.—During the two past years six or eight mowing machines have been introduced within the limits of our Society, and successfully used; others are preparing their farms for their use. In fact our farmers generally, those who are worthy the appellation, are availing themselves of the improved implements of husbandry.

Comparing the present with the past few years, a manifest improvement is noticeable in every department of agriculture. All kinds of stock, especially sheep, are very much in advance of the past; and every man who makes farming his entire business has no reason to be discouraged.

In our midst are three tanneries—Webb & Co. of Lowell, Burland of Lincoln, and Messrs. Kingman & Co. of Winn, or Five Islands, as it was formerly called. All of them are in successful operation, and doing a paying business. The one at Winn is larger than any other on the Penobscot. About three years ago the first blow was struck for its erection, and two years have now elapsed since it commenced running—consuming from twenty-five

to thirty cords of bark per day, and giving employment to some three hundred men.

Amount of premiums offered, \$365; amount of premiums awarded, \$202.

SHEPARD BEAN, *Secretary*.

WEST PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

This Society held its Twelfth Annual Cattle Show, Exhibition and Fair, at East Corinth, September 25th and 26th, 1866. The weather was unfavorable—a rain storm set in early on the first day and continued at intervals through both days, damping very much the out-door department.

The show of stock was, however, very good. Oxen and steers in particular were extra; and the trials of strength and discipline by oxen and horses were superior to any former exhibition.

The Show in the Hall was very attractive—more so perhaps on account of the rain and mud outside. The fruit department was excellent; the specimens of crops very good. Large entry of butter and cheese of superior quality, and a fair display of preserves, jellies, etc., were on the tables.

Of domestic manufactures, needlework, paintings, fancy articles, etc., the Committee remark: "The display of articles in this department was not so full as in former exhibitions. The unpleasant state of the weather was no doubt the principal cause. It was gratifying, however, notwithstanding all the impediments that presented themselves, to witness the many evidences that industry, economy and taste were something more than mere names amongst the fairer portion of our race. It was pleasing and flattering too to witness the various ways in which these virtues were combined in order to contribute to the welfare and comfort of man. The firm, thick, fullered clothes, the soft flannels, the nice double mittens and hose, and woollen blankets, all to protect us from the cold during the rigorous winter. The beautiful hearth-rugs and patchwork quilts were tangible proofs that economy, that handmaid of prosperity, was consulted in these contributions

to our welfare, and that while our comfort was enhanced, our pockets were not depleted. The specimens of needle-work and the crocheting demonstrated that not only industry and economy but even taste had been brought into requisition to add to our welfare and comfort."

The crop department opened with a large entry, but many failed to appear with the necessary statement. N. H. Shaw of Exeter, produced from one acre $31\frac{1}{2}$ bushels wheat; from another acre $87\frac{1}{2}$ bushels corn; from another acre 51 bushels oats and peas, and from another acre 262 bushels potatoes. E. F. Crane of Kenduskeag produced from one acre 27 bushels wheat; from another acre $90\frac{1}{2}$ bushels corn; from another acre 39 bushels barley, and from another acre 330 bushels potatoes. E. B. Stackpole of Kenduskeag produced from one acre 21 bushels wheat; from another acre 27 bushels buckwheat; from half an acre 112 bushels potatoes; from one-fourth acre $7\frac{1}{4}$ bushels beans, and from one-eighth an acre 60 bushels carrots. B. Baston of Levant produced from one acre 51 bushels barley. W. E. Atwood of Kenduskeag produced 501 bushels ruta bagas from five-eighths of an acre. Jacob Eastman of Exeter produced from one acre 62 bushels corn; from another acre 248 bushels potatoes, and from half an acre 136 bushels potatoes. Mrs. A. Blake of Corinth produced 79 bushels corn from 155 square rods.

Seventeen new members were added, and we judge from indications considered unmistakable, that had we been favored with good weather our Show would have surpassed any other held in this place.

Amount of premiums offered, \$644; amount of premiums awarded, \$261.

T. P. BATCHELDER, *Secretary*.

PENOBSCOT AND AROOSTOOK UNION AGRICULTURAL AND HORTICULTURAL SOCIETY.

SECRETARY'S REPORT.

After a suspension of three years, our Fair this year was a success. It was held on the 11th of October at Patten. The day was pleasant, and the collection of people, farmers and others, was large. It was emphatically a farmer's holiday.

At 11 o'clock A. M. the Society assembled at the academy and listened to a practical address by the Rev. E. Fobes of Patten, after which the Society again assembled in the Academy Hall and partook of a farmer's dinner, furnished and prepared by the ladies of the Sidewalk Society of Patten Village. After the dinner was disposed of, the awarding committees attended to their duties.

The collection of horses and cattle was not so large as in some past years, but those exhibited were better than usual, showing the fact that our Society has paid attention to the improvement of stock.

Several valuable horses were on exhibition, among which was a stallion two years old, owned by Mr. Edward Jackman of Sherman. Mr. J. S. Hall of Patten and Mr. Rand of Sherman exhibited colts that were valuable animals. There were other good colts, 27 in all.

Mr. J. S. Hall, Mr. Stimson, and Mr. Joy of Patten exhibited each a pair of working oxen that were large and valuable animals.

Mr. Phelps of Mt. Chase exhibited a large and valuable stock cow and two good heifers.

There were many other valuable animals on the ground that deserve favorable notice.

The cattle were mostly of the Durham grade with a cross of the Devon.

Although there are many good flocks of sheep within the limits of this Society, only one was on the ground, and that was owned by Mr. Thomas Myrick of Mt. Chase.

This country is well adapted to wool growing. Sheep do well and pay well. Wool and lambs sell for cash at our doors.

Mr. James S. Mitchell of Patten keeps on his farm 100 sheep;

his income from wool and lambs amounted this year to about \$500 in cash. Many other farmers with smaller flocks of sheep have found them equally profitable.

In the ladies department were many articles of home manufacture, which were good and valuable, such as all wool cloth, cotton and wool cloth, blankets, flannel, drawers, mittens, yarn, quilts, carpets, rugs, stockings, and fancy articles.

Many varieties of apples were on exhibition, grafted and native apples. A. Cushman, Esq., of Sherman, H. N. Darling of Patten, C. O. Brown of No. 6, were the principal exhibitors of fruit.

I have said nothing about hogs, but this is not a subject of small importance, when pork is worth \$50 per barrel. Some of our farmers make pork raising a profitable business. Mr. S. Wiggin of Patten slaughters every year hogs that weigh 500 to 700 pounds each, which at 16 to 18 cents per pound amounts to quite a pile of cash.

Oat raising is another item of farming which does well. Mr. J. B. Leslie & Bro. raised this year, on their farm, on the plow, 900 bushels of oats, which sell at 75 cents per bushel—\$675.

Why should our young men go west to make farms, when cheap lands and good lands and good crops and good markets can be found in our own State?

All business is based on cash. Show our young farmers how they can raise the dollars and cents on their farms and there will be no want of energy; they will cut down the trees and turn up the sod, and farming will go ahead. Farmer's colleges and farming improvements and improved stock, are all well enough, but the main question after all is, how shall we get the dollars, how shall we pay our bills?

Amount of premiums offered, \$150; amount of premiums awarded, \$95.

LUTHER ROGERS, *Secretary*.

The following notes are furnished by Mr. A. Cushman:

The past season has been favorable for crops of all kinds. The frequent rains produced an abundant crop of grass, but much of it was damaged in harvesting, the haying season being wetter than was ever known here before. Intervales were overflowed most of the time during the season for cutting grass, and most of them remain uncut.

Wheat has been invariably good. The two prevailing scourges of wheat have been unknown the past season. Neither rust nor midge have done any damage the two past summers. Its cultivation is on the increase.

Corn has produced an abundant harvest for all who planted and treated it properly, as the entries at our Society will show. More should be planted.

Oats have produced abundantly, and the grain is unusually heavy, often weighing 37 or 38 pounds per bushel. They are now worth 75 or 80 cents per bushel.

Barley has done hardly as well as usual, not producing the usual number of bushels, yet the grain is good. It is not extensively cultivated.

Buckwheat as usual is good. It yields well on poor land, and farmers depend upon it mainly for making their pork. It is generally quite a valuable crop, easily harvested, and leaves the ground more light and less impoverished than any other crop.

Rye whenever sown returns a fair compensation for labor, but there is but little sown.

Peas as a field crop are but little cultivated, but will do better on poor, worn out land than any other grain, and leave the land in good condition.

Beans have been more damaged than any other crop the past season, being rusted by the excess of wet weather, though in some cases the yield was very good.

Potatoes have resulted much better than was expected. The exceedingly wet weather rusted the tops, and it was feared the rot would destroy the roots; and in some instances it did make its appearance, but has done very little injury. The crop was good and the quality fair.

The past season has been very poor for fruit, by reason of a small worm which made its appearance in the blossom buds before they were in bloom, destroying from a few on a tree in one case, to the whole in another. Late last fall small, light-colored millers were flying around the trees, and probably deposited the eggs in the blossom buds, from which the worm above referred to proceeded. The forest was filled in this vicinity with an innumerable number of those millers, one and two years ago, and the result was, the June following the trees were covered with worms, who devoured the leaves, and made the trees almost as leafless as in

January. Those on the apple trees were the same. If they stood near the forest they were injured more, if further off they suffered less. My orchard would have probably produced four or five hundred bushels of apples if the worms had let it alone, as it was I got one hundred. Apple trees look healthy and vigorous.

NORTH WALDO AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Fifth Annual Show and Fair of the North Waldo Agricultural Society was held at Stevens' Trotting Park in Unity, October 9th and 10th, 1866. The weather was very fine. The number of entries as large as usual. The show of neat stock, horses and sheep was good, and they were all in good condition, the fall feed never having been better in our locality. The Show at the Hall was excellent. A good display of fruit, and the report of farmers is of large crops of corn. Wheat and potatoes were better than usual. Some of our farmers report their wheat at from thirty to forty bushels per acre. Potatoes from three to four hundred bushels per acre.

Amount of premiums offered, \$285; amount of premiums awarded, \$262.

ELI VICKERY, *Secretary.*

WALDO COUNTY AGRICULTURAL SOCIETY.

REPORT OF SECRETARY.

The Annual Show and Fair of this Society was held October 17th, 18th and 19th. The weather was fine and the attendance unusually large. The entries of stock were 137. At the Hall 193 entries were made, being a larger number than in previous years.

The character of the cattle exhibited was highly creditable, embracing Devons, Herefords, Durham and Ayrshire. The show of sheep was not what it ought to have been; and few swine were shown. Colts were very good. Fine specimens of farm, carriage and work horses were present.

The fruit show was good, but not up to last year. Roots and garden vegetables were shown in profusion and excellence; also fine samples of grain, oats, peas, beans, barley, wheat and Indian corn.

The Fair closed on the 20th, having proved one of the most successful ever held by the Society. The weather was fine throughout, the attendance much larger than ever before, and the receipts over a thousand dollars.

Amount offered in premiums, \$705; amount of premiums awarded, \$631.

T. THORNDIKE, *Secretary.*

SAGADAHOC AGRICULTURAL AND HORTICULTURAL
SOCIETY.

REPORT OF THE SECRETARY.

The Twelfth Annual Fair and Cattle Show of this Society was held upon the grounds of the Society, Topsham, October 9th, 10th and 11th, 1866. Tuesday, as usual, was devoted to the exhibition and examination of cattle, sheep, swine and poultry, also ploughing, all of which passed off satisfactorily, except the show of cattle, which was unusually small, not equal to any of our former exhibitions. We noticed many good pairs of oxen, and some fine cows and good young stock, by the most enterprising of our farmers, chiefly from the immediate neighborhood of the grounds. Of sheep we had a good show, much better than usual. Prominent among them was the South Down, the preferable breed in our locality for wool and mutton combined. Many coops of turkeys, geese and fowls, proving by the specimens presented that the raisers are alive to improvements.

We have within the bounds of our Society excellent specimens of oxen, and in large numbers, also as fine cows as are to be found elsewhere, although not so numerous, and we hope to be able to say that our next exhibition of live stock is the largest and best ever seen upon the grounds, and no earthly reason can be given why it should not be so.

Wednesday was the day for exhibition of horses; and this part of the exhibition showed that there was a good improvement from former shows. Unusual inducements were offered exhibitors of trotting horses, which brought out many of the fast nags from other parts of the state, and also a large gathering of people to witness the same. The track was in good condition. As fast time never was made upon the grounds before. We have now within the limits of this Society, owned by Messrs. J. & S. Sampson of Bowdoinham, a promising Knox stallion, an imported English and French stallion, owned by A. S. Perkins of Topsham, and a Young Flying Eaton stallion, owned by J. H. Alexander of Topsham. Our people are awake to improvement of horses, not only to horses for all work but also for speed.

The Society building was opened to-day to exhibitors, and here was seen a fine display of field crops, especially of corn, pumpkins and squashes, which was very fine; root crops in good variety, bountiful in quantity and monstrous in size; apples in large quantities and in great variety; pears scarce, but many good specimens; grapes of many kinds, chiefly raised in open air, and well ripened. And last but not least, the ladies of the Society displayed very extra specimens of household made fabrics of cotton and woollen goods, together with fine samples of needlework, products of their own hands during the past year, giving evidence that industrious and skilful habits have been steadily pursued by the few exhibitors, and ought to be by the many to their profit.

Thursday was spent in hearing reports from the awarding committees, and by short addresses from several gentlemen, that were listened to with eager attention, especially the addresses, which seemed to us as words fitly spoken; after which the ladies and gentlemen's equestrian exercises took place, closing the exhibition, with fine weather the whole time, with much larger attendance than usual, and consequently the gratifying result of much larger receipts, assisting us in reducing our Society's debt. We hope soon to be able to say that we are out of debt and are using receipts to improvement of agriculture and the arts by offering large premiums, and inducing more competition among farmers and mechanics.

We feel largely indebted to those who year after year make it a point to do something for the exhibition; but we have a large and fine building and it requires the labor of many to get up a good show. But many of our farmers are finding out that no better way for advertising any article they have to sell can be found than by exhibiting such articles at our Fair. And we have yet to find the mechanic or artist or merchant who will say that he has not received a great advantage by contributing to our exhibition commensurate with the efforts made. In conclusion, my conviction is that the influences of the Society are widely felt for good, and the interest in the exhibition by the public increase.

Amount of premiums offered, \$573; amount of premiums awarded, \$432.

ISAAC P. TEBBETTS, *Secretary*.

FRANKLIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Twenty-sixth Annual Show and Fair of the Franklin County Agricultural Society was held at their grounds in Farmington the 2d, 3d and 4th of October, 1866.

The weather was good on the opening day of the Show, and the exhibition of stock was better perhaps than ever before, plainly showing the influence of the Society upon our farmers, even upon those who are not members. Here were oxen girting eight feet, when at the formation of our Society seven feet was considered all our stock growers could hope for. This department was pronounced by good judges a decided success.

The Fair at the Hall opened on Wednesday, also the exhibition of horses. Although the weather was not what could be wished, the attendance was large and the exhibition good.

On Thursday, the last day, the weather was cold and windy, yet the number of people present was never larger, who listened to an excellent address by Dr. N. T. True, giving many valuable hints to all, especially to the farmer and mechanic.

The specimens of butter and cheese were excellent. The exhibition of fruit was large; we think the most ever on exhibition at our Hall. Maj. Loren Adams and others presented fine lots of grapes. Maj. S. Dill of Phillips was on hand with his cranberries, for which he receives our thanks.

The exhibition of domestic manufactures and fancy articles was good, especially those of the useful, including all wool cloth, cotton and wool flannels, diaper, rugs and mats, &c. The opinion generally pervades that our Fair and Show passed off satisfactorily, and in all of its departments was a success.

Amount of premiums offered, \$339; amount of premiums awarded, \$250.

PETER P. TUFTS, *Secretary.*

NORTH FRANKLIN AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition, Show and Fair was held at Phillips, on Wednesday and Thursday, October 10th and 11th, 1866.

This Society now consists of about two hundred members. Its financial circumstances are steadily improving, and its influence for good increases every year.

Wednesday, the first day of the Exhibition, was assigned for show of horses, cattle, sheep and swine. The number of entries was larger than for several years. Neat stock continues to be a prominent feature of the Exhibition. The number of oxen entered was large. The prize for town team of oxen was awarded to Phillips. Stock and milch cows, bulls, steers and heifers were well represented.

Mr. Joshua Taft of Weld, entered one pair of yearling steers girting 6 feet, well matched and proportioned. The prize for town team of three years old steers was awarded to the town of Phillips; average girth 6 feet 4 inches. The second premium was awarded to the town of Avon; average girth 6 feet 2½ inches. The bulls exhibited were Grade-Durham, Devon and Hereford.

In the horse department twenty-five entries were made, and the specimens on exhibition fully justify the farmers of North Franklin in the pride which they display in exhibiting these animals.

The sheep department was poorly represented. This, by no means, is owing to a scarcity of sheep or lack of interest in this department; on the contrary, the interest in wool-growing was never greater than now, as the numbers of sheep and quality of the wool will amply testify.

In the crop department considerable interest was manifested in making entries, but at the meeting of the adjudging committee in December many failed to present statements and specimens. Mr. Mark G. Walker of Phillips, produced from one acre 144 bushels of ears of corn. Mr. James W. Butterfield of Phillips, produced from one-half acre 76 bushels. Mr. D. L. Harlow of Avon, raised from three and one-half acres 196 bushels well cleansed grain, 46½ bushels oats and peas, 149½ bushels clear oats; he also raised from

one-half acre 190 bushels potatoes. Mr. Harrison Beal of Avon, raised from one-half acre 177½ bushels potatoes. Mr. H. M. Butterfield of Phillips, produced from one-half acre 175 bushels.

There is quite an interest now felt among the farmers in this section in wheat-raising, those having tried the experiment being rewarded with bountiful crops, some raising as many as two hundred bushels.

The exhibition of fruit and vegetables was rather meagre; Maj. S. Dill, however, displayed a very palate-tempting variety of apples, grapes and cranberries.

Second Day. Address by E. D. Nash, Esq., of Phillips. Mr. N.'s address was an able and interesting production adapted to the occasion and wants of the Society.

The display of domestic manufactures, needlework, paintings, &c., was praiseworthy and did much credit to the ladies who support this department.

In conclusion we would remark that there is in this section a growing desire among both farmers and mechanics to be masters of their professions. This Society, we believe, in the fifteen years of its existence, has done much to the attainment of this end. Agriculture is the parent of all other arts; from it they derive their sustenance, their support, and as the parent, there are none but should do it homage. One of its chief supports are our Agricultural Societies, and as such are deserving of aid from every hand.

T. A. JOSSELYN, *Secretary.*

EAST SOMERSET AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The East Somerset Agricultural Society held its Annual Exhibition in Hartland on the 11th and 12th of September, 1866.

The show of neat stock was not as large as in some preceding years, but was of very good quality. James Fuller of Hartland, exhibited full-blood Hereford and Jersey bulls. O. B. Stinchfield of St. Albans, had on exhibition a Jersey cow and heifer, which were good specimens of that breed. There were some very good oxen and steers of the Hereford breed.

The show of horses was larger than of any former year and of a better quality. There were some fine colts of the Drew breed.

The show of sheep and swine was small. Clement Goodwin of Hartland, had a fine flock of Spanish Merinos.

The exhibition of manufactured articles and dairy products was small, owing to the day being rainy.

The show of fruit and vegetables was not as large as some former years, the Show being too early in the season.

Amount of premiums offered, \$278; amount of premiums awarded, \$217.

THOMAS FULLER, *Secretary*.

WEST SOMERSET AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition of this Society was held on the Fair Ground, near Anson village on the 10th and 11th of October, 1866. The weather was fine and the attendance both days very large. Many noted farmers from distant parts of the State were present, and all conceded that the show of stock and sheep excelled any show ever held in Maine. The Maine Farmer was right when it predicted (beforehand) the best sheep show that could be got up in Maine.

There were on exhibition two hundred and eighty head of horned cattle, three hundred and fifty sheep, including bucks and lambs, thirty-five horses and colts, and some swine. The neat stock was mostly Durham, with a sprinkling of Herefords, Devons and Jerseys. The Durhams are the favorites of the farmers, who breed mostly for working oxen, and among whom can be found the best oxen in the State. The sheep are of the fine wool variety, nearly all Spanish Merino. The predominating breed of horses is not easy to determine; the finest animals, however, are of the Knox or Drew blood.

Liberal premiums were offered on field crops, but, though the crops have been generally good hereabouts, there were but two entries made,—one each on corn and wheat, the statements of which are forwarded herewith. For several years back our farmers have generally abandoned the cultivation of wheat; but the experience of the last two or three years shows very good results from what has been sowed, and another year we think will show a large increase in this direction. Wheat has been good in this locality this year; all other grain crops have been abundant, the corn of not quite so good quality as last year. Of potatoes there was a wide spread and an abundant crop.

The exhibition of dairy products, fruits and garden vegetables was unusually small, more attention being paid to raising fine animals than to making butter and cheese.

The department of household articles, domestic manufactures,

needle-work, fancy, &c., &c., was very well filled, showing an increased interest in the manufacture of domestic cloths, &c.

On the whole our Society has been very successful this year. We have succeeded in entirely liquidating the debt hanging over us and leaving a "shot in the locker" for further improvements.

Amount of premiums offered, \$282; amount of premiums awarded, \$254.

ALBERT MOORE, *Secretary*.

The corn was grown on green sward broke the fall before; the soil is rocky loam, had been mown five years; there was about five cords of barn manure applied to the hill, and had been thrown into the hog-yard the summer before. It was planted about the 20th of May; hoed twice. Before hoeing the first time I applied one handful to each hill of equal parts of lime, plaster and ashes. It was harvested about the first of October, and had one hundred and eighty-seven bushels of ears, weighing $87\frac{1}{2}$ lbs. to the bushel.

Cost.

Plowing ground,	\$3 00
Harrowing and applying manure,	3 00
Cultivating and hoeing twice,	4 00
Harvesting,	4 00
Cost of manure,	10 00
Total cost of crop,	\$24 00

Value.

Ninety-three and one-half bushels of corn,	\$140 00
Two loads of pumpkins,	3 00
One ton of fodder,	5 00
Manure left for future crops,	5 00
Total,	\$153 25
Deduct cost,	24 00
Profit,	\$129 25

T. F. BOOTHBY.

Embden, Oct. 25, 1866.

The mode of raising my wheat was as follows: Broke up the ground in the fall of 1864—one acre and a third. In the spring of 1865 hauled on fifteen loads of manure from the heap and harrowed

it in, and dropped in the hill ten loads of old manure, and planted with corn. Harvested 109 bushels of ears of corn, and pumpkins and beans enough to pay for the labor.

On the first day of May, 1866, I plowed the ground, and on the fifth harrowed it and sowed the wheat, three bushels. On the 21st day of August I harvested, and November 3d threshed the wheat, amounting to $30\frac{1}{2}$ bushels, equal to some over 20 bushels to the acre.

Cost.

Plowing,	\$3 50
Harrowing and sowing,	8 50
Seed,	9 00
Harvesting—two men one day,	4 00
Threshing,	2 50
Total,	<hr/> \$22 50

Value.

Thirty and one-half bushels of wheat,	\$91 50
Three tons of straw,	15 00
Total,	<hr/> \$106 50
Deduct cost,	22 50
Profit,	<hr/> \$84 00

JOHN M. HILTON.

SOMERSET CENTRAL AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Exhibition of the Society the past year compared favorably with those held in previous years. The number of oxen on exhibition was a third larger than the previous year, and were considered equal in quality. The number of horses was equal to any show which the Society has ever had. Cows, steers and calves were in attendance as usual, in about the same number and quality.

S. W. Coburn presented some fine specimens of thorough-bred Durhams; also A. B. Chandler a very fine blooded Durham bull and heifer from the herd of Mr. Percival of Vassalborough. Mr. John Wentworth exhibited also a thorough-bred Hereford bull.

There were some very good specimens of thorough-bred sheep of the Spanish, South Down and Cotswold varieties.

In the horse department we never have had but one or two stallions that had any claim to *good breeding*. While the most of farmers will readily acknowledge the necessity of blood in cattle and sheep in order to gain a given result, and are carrying their theory into practice in many cases; but in the breeding of horses a slipshod and hap-hazard course is pursued. Upon the whole I think there is more interest felt in regard to the breeding of various domestic animals than has heretofore existed.

The crops in 1866 as a whole were very good. Hay, our staple crop, an average. Potatoes, those planted by the 20th of May were good, and in favorable localities excellent crops were obtained, often 200 bushels per acre; but late planted fell short. Corn obtained a good growth, eared well and matured in fine condition. Wheat was good; from the inquiry which I have been able to make I think the crop averaged 15 bushels per acre and the quality, when well cleaned, equal to best flour in market.

The spring opened finely for the farmer and continued so until the crops were put in. The growing season commenced about the 25th of June and continued about four weeks, after this wet and rather cool prevailed until frost; in consequence late crops did not meet the hopes of the farmer.

Amount of premiums offered, \$483 ; amount of premiums awarded, \$336.

NORRIS MARSTON, *Secretary*.

WASHINGTON COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Exhibition was held at Pembroke September 26th and 27th. The weather was favorable the first day and the show of stock, vegetables and dairy products was good, both in quantity and quality. The second, devoted principally to the exhibition of horses and trial of their speed, was rainy, yet some 1500 people were present and a good degree of interest was maintained throughout.

The display of milch cows, working oxen and horses was an advance on former years, showing a steady improvement in *breed* as well as in numbers. There were several entries of sheep, large in size and with heavy fleeces of fine wool, of which the South Down is the predominating breed. A pair of swine for breeders, imported from Pennsylvania by M. L. Wilder, Esq., of Pembroke, were on exhibition and took the premium.

Corn and grain crops were meagre, occasioned by a wet, backward spring and the rust which attacked the latter. Rust and rot attacked the potato plant, yet full an average crop was harvested. The statement on which the first premium was awarded shows a crop of 284 bushels to the acre. The hay crop was light, not over two-thirds the usual quantity, and was generally much damaged in getting.

Amount of premiums offered, \$685 ; amount of premiums awarded, \$402.

E. K. SMART, *Secretary*.

WEST WASHINGTON AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Annual Cattle Show and Fair of this Society was held at the Society's grounds in Jonesboro', October 3d and 4th. The weather was not so favorable as desired. The first day was cold and cheerless, but the second was somewhat warmer, yet uncomfortably cool. The attendance was larger than expected, considering the weather, but not so large as that of last year.

The show of cattle was better than at any other Fair of this Society. It was remarked by men at the Exhibition who were acquainted through the State, and well qualified to judge, that a better show of cattle would not be exhibited in the State during the season. The improvement in stock has been mainly effected through the introduction of the Durham bull presented to the Society by Mr. Black, and the enterprise of some few individuals in the Society securing blood animals. There were some very fine bulls on exhibition of the Durham and Ayrshire breeds.

The show of horses was not, perhaps, quite up to that of last year, but very fair. There did not appear to be that interest in showing off the merits of this noble animal, either as regards speed or family uses, as at former shows; but a deep interest was taken in exhibiting the strength and power of the horse and ox in drawing, which was quite an attractive feature of the Show.

The sheep shown at the Fair this season were fine specimens, and the number greater than that of last year. The interest in the improvement and management of sheep seems to be unabated.

There was a very good show of swine this year; the number was not large but the samples good, mainly of the Chester and Suffolk breeds, with some others.

The show of dairy products was rather limited, although the season has been quite favorable to that branch of husbandry. The prices of butter and cheese are ruling high,—butter from 30 cents to 45 cents per pound, cheese from 18 cents to 25 cents per pound.

The stock of cattle in this section, as a general thing, is very much below the requirements of the inhabitants, rendering the prices of all kinds of stock very high.

The grass crop was very light this season, and owing to unfavorable weather was more or less damaged in curing. Very little hay of the first quality was harvested. The long continuance of wet weather through the entire haying season so overflowed many of the low meadows and intervals as to render the grass growing upon them entirely worthless for hay, and by that means so diminishing the quantity of forage that many farmers hereabouts will scarcely have enough to carry them through the winter, although the fall has been very favorable to the production of later feed, thereby rendering the quantity of hay necessary considerably less than ordinarily.

The potato crop was remarkably large this fall, yet considerably affected by the "rot," many losing large quantities after they were cellared.

I have thought, and am still of the opinion, that agricultural societies, in this part of the State especially, do not give sufficient encouragement in the way of premiums, to the production of crops of grain, such as corn, oats, barley, &c. These crops can be raised, at present prices, with a profit to the farmer, and were they grown in considerable quantities would go a great way towards retaining a large amount of cash in the State, that now goes to the west to pay for corn used by lumbermen and others to feed to teams.

This Society, under present management, is having a very beneficial effect on the agricultural interest of this section.

Amount of premiums offered, \$664; amount of premiums awarded, \$460.

JAMES L. BUCKNAM, *Secretary*.

SELECTED PAPERS.

POWER, FORCE AND MATTER:

THEIR DIVERSITY, UNITY, SIMPLICITY AND HARMONY, THE BASIS OF
ALL SCIENCE AND ALL KNOWLEDGE.

BY PROF. J. B. TURNER.

[From the Transactions of the Illinois Agricultural Society.]

It is well on all subjects, sometimes to recur to fundamental principles and consider to what final results these would carry us, if unsparingly applied to all objects of research or of thought. Especially is this appropriate in our investigations of the Laws of Nature; for, by this method alone, can we know whether our assumed principles are true or false, and what we are to expect in their future application to phenomena still unknown, or but imperfectly apprehended and classified under these general axioms or truths.

The most rigorous application of our assumed axioms to unknown as well as known phenomena, although in one aspect it may be simply theorizing, inasmuch as it may indicate a probable theory of these phenomena, in another aspect it is only a proper testing of the truth or falsehood of these axioms themselves. In either view, however inappropriate it may seem to the mere pedantic smatterer in science, it cannot be uninteresting to the true philosopher. I have thought, therefore, that it would neither be improper nor unacceptable, on the present occasion, to call the attention of this association to the probable ULTIMATE AND UTTER SIMPLICITY OF NATURE, OF THE WHOLE UNIVERSE OF GOD, as a necessary logical consequence of the fundamental axioms of the Baconian Philosophy.

None can be more fully aware of the difficulty of presenting such a subject, than the members of this association; and none can lament my incompetency to the task more deeply than myself; but

with that indulgence which confessed ignorance may always claim from the truly wise, I will endeavor to present an outline both of my thoughts and of my doubts in a somewhat intelligible form ; with less regard to the technical terms and theories of extant science, or the demands of either precision of thought or elegance of style, than to the present necessities of a miscellaneous audience.

What then is the *ultimate axiom* of the Baconian or Modern Philosophy ? It is the assumption of the absolute simplicity of the law of causation—or the doctrine that all effects are produced by simple and not by a complex causation.

This doctrine is based on the observation of the entire simplicity of causation, so far as our knowledge has as yet extended, or the extreme unity and simplicity of those causes which, at all points, are found to underlie and produce the boundless phenomenal variety of the Creator's works. And the *philosophic rule*, derived from this, is, never to assume but one cause where that is adequate to the result.

Is this fundamental doctrine and its resultant rule, correct ? and, if so, SHALL WE, DARE WE, apply it to all known being and phenomena ? But, if not so applicable, it is not, of course, correct, and should be at once abandoned, as untenable ; or, at least, should be so far limited and explained, as to indicate, truly, precisely how much we do mean, and what we do not mean, by it. And even if this discourse should have no other use it may provoke thought and incite a more careful scrutiny on this point.

It is self-evident that we know but three generic forms of existence or of being in the Universe of God. To designate these by the old and more common terminology, we should call the first or lowest in the order, **MATTER** ; the second, the **IMPONDERABLE AGENTS**, such as light, heat, electricity, etc. ; and third, the **VOLUNTARY AGENTS**, such as men, animals, beasts, birds, etc. The perceived peculiarity of the first, or of **MATTER** is, **FORM** and its **ATTENDANTS** ; that of the second, is simple **FORCE**, capacity of producing motion, or tendency toward motion, and its attendants ; that of the third class, is **POWER** of thought and of will, in higher or lower degrees ; or, **POWER** of will and its attendants and results ; or, perhaps, better, **SIMPLE SELF-MOVING POWER**. By a shorter terminology, then, I will name these three generic forms of all known being :

MATTER, producing form, and its attendants ;

FORCE, producing motion, and its attendants ; and

POWER, producing thought and will, and their attendants and results.

I might then, perhaps, here say, that simple MATTER, FORCE and MIND, include all known things; except that it would be straining the usual signification of *mind*, to make it embrace all those lower orders of being, which seem to have some power of thought or of will; and it is not clear, to say the least, that any form of voluntary being, belongs to, or results from, mere MATTER and FORCE; though it may be so. For, though this voluntary principle, or POWER, of will or of thought, seems to exist in three distinct forms:—in connection with reason and conscience, as in the case of moral beings; in connection with intelligence or thought, in greater or less degrees, as in the higher orders of animal life; and, in connection with bare instinct, in still lower orders—we still know nothing about it, except that it is a mere POWER, of some sort, manifesting volition of thought and will—just as FORCE is known only as the cause producing motion. But, on the other hand, we can scarce resist the impression, that matter must consist of atoms or elements, though actually known only as the cause of *form* and its attendants. And thus matter, stripped of its phenomenal adjunct of form, presents itself to us as simple ATOMS; and then we have in the world, only ATOMS, FORCES and POWERS—the one producing, (or, perhaps better, merely presenting or resulting in,) all FORM; the next, producing all motion and change of place or form; and the last producing all thought and will—the great Trinity of Universal Science and Nature—the first, the proximate cause of all form; the second, the proximate cause of all motion or change; and the third, the proximate cause of all thought and all will; and in its highest manifestations, the great first cause of, or rather power, producing, all things—all motion—all change—all matter—all everything. The first two of these, matter and force, belong to the realm of the properly natural, or the realm of natural and necessary causation; the last, or POWER of will belongs to the realm or sphere of the supernatural, and lies, at least so far as we know or can see, wholly outside of the realm of necessary causation, and within the realm of voluntary self-determining, self-controlling power—existing, as indeed as do, also, matter and force, under an infinite variety of phenomenal aspects; or rather, working with infinitely diversified degrees and aspects of power; but ever, still as an original, spontaneous and independent fountain or source of POWER, however small or large; and holding within itself,

in its own inherent nature, the cause of its own action ; and not, like matter and force, moving only as it is acted upon by some cause from without. But as matter, force, and power or mind, must all alike have an appropriate sphere of action, so also, in each alike, this sphere of action is not the cause of their action. For example :—as matter must have space, as its sphere of action, or it cannot exhibit its phenomena of form ; and as force must have matter to act upon, as its sphere or occasion of action, or it cannot produce its phenomena of motion, or of tendency toward motion—so this *power*, this ORIGINAL SELF-DETERMINING and SELF-CONTROLLING POWER of will, or mind, must have its proper sphere or occasion of action, or MATTER to act upon and FORCE to act with, or something to choose and to do, or it cannot exhibit its peculiar phenomenal power. But space is not the cause of power, nor is matter the cause of force, nor are all together the cause of volition or of the action of this POWER of will or mind, but only the instruments or the occasions which render such action possible.

And precisely here, I pause to make my lowest bow to good old Jonathan Edwards and his erudite disciples, and bid them God speed. For it is self-evident that neither matter nor force of any sort, or in any form has any more tendency or even appetency to control mind, or will or POWER, in the true sense of the terms, than space has to control form, or inert matter to control force. And the only answer to the question “what causes this mind, this POWER, to act so and so ?” which we can give, is simply this : “God made it, not a form, or a force, but a POWER, in its own nature and sphere capable of such action—just as he made force capable of its own natural action upon matter, and matter capable of assuming form in space.” In other words, the natural only, or MATTER and FORCE, are governed by laws of causation ; but the supernatural, or mind, will, real POWER, is governed only by the laws of volition or the laws of the SUPERNATURAL—which are neither laws of form or of force or of causation, in any such sense as is ever implied in the realm of the natural.

If now we look over the world of sense, we shall find all its infinitely varied and wondrous phenomena, *at any given moment*, to consist simply of matter, in its various forms and its attendant colors—though color probably belongs to the order of force rather than of matter—and whatever *change*, either of form, or of size, or place, occurs in these atoms of matter—whether from without or from within—whether of growth or of decay—is the result of some

FORCE, astronomical, mechanical or chemical, producing or tending toward motion ; and these can no more be changed, without force, producing motion, than there can be power without matter. The question then here arises—are these two all-producing, all-embracing elements of all being, and all change in the physical world, simple or complex ?—each a unit, in itself, or multi-form and varied ? It is not enough to say that the books give us a great many kinds of matter, and a great variety of forces ; for the question is—how do the books know ? and on what authority do the books contradict the very axioms, on the basis of which they themselves are professedly written ? Is their doctrine of the simplicity of nature, and of causes, to be retained or abandoned ? That is the question. If it is to be rigorously retained, then we come, at once, to a view of the utter unity and simplicity of nature, that is most sublime and astounding, and still just what he who knows how simple gravity wheels all suns and spheres and atoms should be prepared to expect—and certainly many of our best writers and thinkers admit the possibility, if not the certainty, of this entire simplicity of matter.

It is generally conceded, then, that matter consists of atoms, or, as they are sometimes called, elements ; and it is also quite generally supposed that we know of more than one elemental, or ultimate, or atomic, form of matter. But do we know this ? or only assume it, without any ground of confidence, and strictly against all our axioms and analogies, derived from other sources ? Some have supposed that at least two ultimate or atomic forms of matter must exist, or else there could be no combination and no change, producing all the varied phenomena of the material world. But suppose that the ultimate atoms of matter are all one and the same—all, if you please, perfectly regular in their shape, like the eggs of the same bird or fowl or insect ; still it is susceptible of mathematical demonstration that the forms into which these ultimate atoms may be piled or congregated, by simply varying the angles of their axis, or their relative distances apart, or both, is absolutely infinite : Thus—take the above mentioned form of matter, which we can most easily conceive of, as an illustration—the egg of a fowl. All can perceive that by varying the angles of their incidence, and their relative distances from each other, the forms in which they may be piled or congregated are absolutely infinite, producing as many forms of piles as there can be forms of matter in the universe of God—however many there may be. I shall soon

show how **FORCE**, or the second great agent in nature, acts upon these atoms of matter, to determine all their relative positions and distances apart, in all their possible aggregations and changes. But one element or phase of this universe force is what we call heat; and the universal effect of this form of force, as it is exerted on all the atoms of matter, well illustrates, at this point, my idea. You take solid ice, and apply the force of heat, and you soon have the yielding fluid, water, from the same identical solid atoms. These same atoms, constituting ice, have now, under the application of this new force—the force of heat—changed both their form and their color, and appear like quite another substance. Apply still more of this new force of heat to this now melted ice, and you have ærial vapor, with the dew, the cloud, the fog, and the rainbow—all still out of your solid ice. Apply more force of heat still, and you have a form of fiery gas out of your inert and sluggish ice, which whirls armies and navies over continents and oceans—grinds granite mountains to powder, and chews up solid iron bars as a horse chews straw. Apply a little more, still, of this new force of heat to your inert ice, and you have an explosion of burning flames, for which we still lack a descriptive name, and, therefore, call it hot steam—hotter than the flame of gunpowder itself, and so uncontrollable, impetuous, and omnipotent, in its action and effects, that the whole solid globe itself cannot restrain or control it. Now, no one supposes that the atoms or elements of the gas, the steam, the fog, the water, and the ice, are different; for we know that they are not, but that these same atoms assume entirely new forms and relations, under this new disposing **FORCE**—or **FORCE** of **HEAT**. And precisely similar results follow in the case of all other forms of matter, when subjected to the same force—or force of heat. These very familiar examples show how all possible forms of matter may, at least, be constituted from one and the same kind of ultimate atoms, as easily as from two or more kinds. And until we give up our axiom, as regards the simplicity of causes, it is strictly unphilosophical to suppose that there is, in reality, but one ultimate atomic form of matter; since to attribute more than one simple cause, where one is adequate to the whole result, is, in science, **UNPHILOSOPHICAL**, if not absurd. But it may be asked—have not chemists demonstrated that there are more elements of matter than one, even in this water itself? I answer no. It is a point that never has been, and, in the nature of things, never can be demonstrated; for we can never declare any form of matter whatever to

be simple, till we resolve all matter into its ultimate atoms. Till then, all we can truly say, in any case, is, that we cannot yet declare it compound—that is, cannot yet analyze it into any simpler form than itself. But not knowing and absolutely knowing are two very different things; though, unfortunately, some seem still to consider them the same.

Again—it may be asked—is not your new force, or force of heat, by which you work these vast changes in the case supposed, material, or only another form of matter? I answer—I have no more reason to suppose that heat is matter, in any proper sense of the term—that is, that it consists of atoms, like other matter—than I have to consider mind, soul, and thought, as matter. Matter is, properly speaking, only that which consists of atoms, and necessarily assumes form. Force is that which, without either known atoms or form, necessarily produces motion or change; and these two have absolutely nothing, in common, so far as we know. And as there is no force in mere inert atoms, to produce either motion or change, so there are no atoms in force which can assume form—no more than thought itself can assume physical form or exert physical force—at least so far as we yet know. True, any one has a right to extend the meaning of the term *matter*, so as to embrace what are commonly called the “imponderable agents,” which I here call simple *forces*; but, if so, he ought at least to be aware that he, by such definition, pushes the term *MATTER* wholly out of its usual and well-known sense—as truly so as he would the term “*cast-iron*,” if, by arbitrary definition, he should so extend its meaning as to make it embrace human souls and bodies; for, so far as we know, these imponderable agents—this universal force, (or these forces, if you please)—have not even so much in common with mere matter as cast-iron has in common with human beings; for we know that there is iron in some form in the body—but there is neither form, the essential matter in force—nor motion, the essential of force in matter alone—even in the smallest degree, so far as we know. And by what logic or rhetoric things totally dissimilar should be put under the same name I cannot conceive. Still further—the question is sometimes asked, whether mind itself is matter. We might just as rationally ask if it is pewter or block tin or cast-iron. It can be neither, except by the most arbitrary definition.

Between that *POWER*, whatever it is, and whatever we may choose to call it, which produces *thought* and *will*, and that *FORCE* which

produces *motion*, and those atoms or *matter* which produce *forms*, there is absolutely not even the slightest resemblance, either in their essence, their modes of action or their uniform effects—so far, at least, as we know or have any reason to believe.

If, therefore, we profess, at all, to class and call different things by different names, we must keep each of these classes, both in name and thought, entirely distinct—at least till we find between them some common idea or element.

Otherwise we might just as well call them by arbitrary definition, all together—all as one “granite,” or “plum pudding,” or “wild geese,” and cease, at once, from all possible reasoning and inquiry about them. For POWER, producing thought and will—and FORCE, producing motion—and MATTER, producing form, are indeed the only three things, known to us in the whole world of things and of thought, that are, AT ALL POINTS—in essence, function and effect—totally distinct and unlike. Why, then, confound or misname or misconceive them?

It might, with far greater plausibility, be assumed that each atom or particle of matter is, in and of itself, invested with a peculiar force, which impels it to move and act, under all conditions, as it does; that is, that this force, producing all motion and all change, is attached inseparably to the atoms which it moves, so as to become, in all cases, an inherent instead of an external and independent force, acting from within instead of from without upon the particles. But if so, the inert atom is still one thing—the thing of mere place and form; while the inherent force is quite another thing—the thing of all motion, all change, all life and all death, and in thought we must separate them, even if *inseparable in fact*.

But if I have not said enough to show the probability, if not the certainty, of the absolute simplicity of matter, it is still best to consider, at this point, the simplicity of FORCE, or of that which produces all motion and all change. For it is self-evident that there can be no change without motion, and no motion without force or a cause producing it; and as we have, in accordance with general usage, called the cause producing form, MATTER, so now, in obedience to the same usage, we call the cause producing motion or change, FORCE. Is force, then, in the created universe, simple or complex?

“How absurd the question!” says one. “Does not common sense teach us all that force is infinitely complex and various? Do

we not all see, with our own eyes, chemical forces, mechanical forces, and astronomical; the force of gravity, electricity, magnetism—of attraction and repulsion; the force of wind, water, steam, and muscle, in all their thousand varied forms? How absurd, then, to speak of force as a simple unit, even granting that matter is but one varied aggregate of simple atoms!"

But stop one moment, my friend. Just now, you were equally sure of multitudinous ultimate forms of matter. You had your oxygens and hydrogens—your nitrogens and carbons—your metals and gases—all neatly boxed up and labeled, in your laboratories and books, as an indefinite number of simple forms of matter. We have already, I trust, emptied some of these empyrical vials—or, at least, written, in fair, legible hand, on their labels, "UNKNOWN," though, by every rule acknowledged by either man or God, presumed to be *simple*; and, by the same great law of simplicity and unity, this seemingly multiform *FORCE* should be confessed a simple unit—at least, till the contrary is proved.

But let us go back, for one moment, and consider again these three phenomena: *MIND*, *FORCE* and *MATTER*. *MIND*, as the original cause of all things; and *FORCE*, as the mere right hand of mind or proximate cause of all change; and *MATTER*, as the element or mere vehicle which, in space, makes all change, all motion, all force, all mind, cognizable to sense. Here is your man with his tea-kettle or boiler, if you please, and his ice. He kindles his fire: for the fire or the heat can no more germinate itself, without some controlling or directing *POWER*, than the ice can melt itself. Now, we have got just these things together: the man, or an original, self-moved or self-moving *POWER*; the heat, or a *FORCE* through which this power—this mind and will of man, may act on matter; and the matter, in the form of ice, on which both *MIND* and *FORCE*, and power and causation may act. Here is *POWER*—self-moved, self-directing power—in the mind and will of the man, or power of *ORIGINAL*, *SPONTANEOUS CAUSATION*, or causation assignable to no force from without the man himself—an independent fountain (so to speak) of force, which we will call, for the sake of distinctness, *POWER*—A *POWER*—to separate it from all other force as such. Second: we have simple *FORCE* or *PROXIMATE CAUSATION* in the form of heat; and third: we have the *ice*, or a form of matter, on which this power of mind or will, or of original causation, can act through, and only through some form of force or some form of proximate causation—in this case, the force of heat. Now, mark: this origi-

nal, spontaneous power—the power of mind—wills to create or apply the force of heat. The heat yields obedience to this original source of power, and necessarily acts upon the ice according to its own laws of proximate causation, and throws it now into the form of water, now into that of vapor, or dew, or rainbow, or explosive gas—according as the first cause, or power, or directing mind, or will, ordains. Now, this is precisely what, and only what takes place in all forms of motion or of change of life, or of decay and death, in all cases whatever in which we know ALL the elements and causes of such motion or change. There is always, first: a POWER of mind or will of some voluntary being, human or animal—as a power or fountain of causation. Second: some form of FORCE applied or directed by this voluntary agent or power; and, third: the form of matter upon which this force acts. We notice that in this case the force applied is simple heat, and the result is varied in proportion to the intensity of its application. Now, if the power of man, with his limited faculties, by the application of the single and simple force of heat, can throw a lump of ice into all these multiform and varied forms, who can doubt the power of God, by the same simple force, under different degrees and aspects, to produce on matter all its varied results?

Again—the Indian or the archer wills to pull his bow-string. This *power* of will sets in motion a *force* in the muscle of his arm; that force moves the bow-string, and that again moves the bow, and that the arrow—which cleaves the air and causes the death of a sparrow, or a hero, as the case may be. Here, again, is an original power—the power of will—setting in motion a series of forces, animal and natural, determining life and death, or, it may be, the fate of armies and empires. But, as in all other possible cases, here is only, *first*, a self-moving POWER of some voluntary being—*second*, FORCE or forces set in motion or action by such power, and the MATTER on which this original power and its obedient force or forces act. And as we find force the sole cause of motion, or change, or PROXIMATE causation, in all cases fully known to us, we find the will of voluntary beings, the sole functions of original causation—the sole SELF-ORIGINATING POWER. And as there is no tendency, so far as we know, in mere matter to produce motion, so there is no more tendency in mere force to act in any way, except in so far as it is acted upon, or moved by some voluntary *power* or original spontaneous source of causation—under the genera of mind, will, voluntary being, or whatever other name you

please to give it; and we have no analogy or well authenticated example whatever of any real or possible change produced without these three concurrent causes of all known change—**MATTER** yielding to force, of some sort, and **FORCE**, directed and controlled or set in motion or action by mind, will, **POWER** or voluntary action of a voluntary being of some sort. Hence, it will appear why I termed **MATTER** the cause of form, and **FORCE** the cause of motion or change, and **MIND**, or power, the first great cause of force, of motion, and of all things—the sole and only fountain of original spontaneous power, at least so far as we as yet know. True, we call this universal force by different names, according to the conditions of its action and the things it acts upon; but in all cases, alike, we know nothing whatever of it, except it is a *simple* **FORCE**, and have not the least reason to suppose it complex in any case more than in the case of heat supposed; and it would be just as philosophical, in this case of supposed heat, to speak of one force of thawing or melting and another force of expanding, boiling, evaporating, exploding, etc., according as the ice was made to melt, evaporate or explode, as it now is, to speak of the forces of heat, light, electricity, etc.; for we know absolutely nothing of any one of these, except simply that it is a **FORCE** producing certain results, widely different, indeed, as in the other case, but no more necessarily from different forces; while our ultimate law or rule of causation should impel us to speak of this all-pervading, (as in the case of matter,) as simple—a simple unit—till we have at least some reason to suppose the contrary; especially if in our observations of nature we ever keep finding new facts and hints, which point toward this same simplicity of causation or of force. True, in popular language, it is well enough to speak of “water-falls” and “wind-falls” and “down-falls” of all sorts, and of force of heat, light, electricity, life, death, gravity, polarity, etc., or of a force of thawing, evaporating and exploding, provided we do not philosophically deceive ourselves and others by our terminology; and constantly remember that, as it is one simple force which produces water-falls, and wind-falls, and rain-falls, and one force that melts and evaporates and explodes. So in all other cases, our real knowledge does not extend one item beyond this single idea of *simple force*, producing varied results, in any case whatever; while many items in our knowledge, as well as the constant developments of science, and, above all, the fundamental rule or law of all science—the great rule of simplicity of causation—should compel us to speak of and

regard all force, of whatever sort, as a simple unit—simple *force*—producing varied results ; which is in fact all we know about it—and we only deceive ourselves when our terminology leads us to think otherwise. But it may be asked—what causes *FORCE* to move, or *MIND* or *VOLUNTARY AGENTS* to will—to act? All we know is, that it is the essential nature of force to move—that is to act as a *force*, whenever brought in contact with matter to be moved or to be acted upon. And it is the essential nature of mind or of voluntary beings to will and to act as a self-moving *POWER*, wherever there are forces, which this power desires thus to set in motion or action—or matter which it desires to act upon. But as the matter does not cause the force which moves it, and is only the necessary occasion, the instrument of its action, so no more does force cause the action of the mind or will, but is only the occasion or instrument which renders its action possible.

In this view of the case *MATTER* is the mere plaything of force, and *FORCE* itself is the mere plaything or instrument of supereminent *MIND* or will. Unless, indeed, contrary to the apparent analogy of all cases of which we can have full knowledge, we resolve all *power* into mere *force*, and consider mind itself only as a higher form of such force, and thus, again, violate a law of language, at least, by including under the same name things which have no perceived analogy—*thought*, *will*—or *VOLUNTARY POWER*, and involuntary *FORCE*.

We see, too, in view of this subject, that “personal identity,” as well as all forms of material identity, depends not at all on the sameness of the matter of which any particular body is composed ; for all matter is, according to this view, a unit ; and all forms of mere matter the same ; while all variations in matter depend wholly on the variations of force or of force and spirit combined. Hence, the same spirit and the same forces necessarily assume and take to themselves the same material forms, whenever attached to matter at all, and are, therefore, identical, just as gold is always gold, iron always iron, or any one of their alloys always identical with the same alloy. Hence, Paul’s reasoning about the resurrection of the body, in the fifteenth chapter of Corinthians and elsewhere, is, at heart, strictly philosophical ; and all objections drawn from the constant or total dissipation or recombination of the particular particles of matter in the body, at any one time, either at or before the period of death, are unphilosophical and absurd ; or, at the

very best, such objections assume what no man knows, or can know, as the basis of his conclusions.

Is, then, *force*, this proximate cause of all motion, simple or complex—one in kind, acting in various ways, or multiform and complex? Now, motion is simple change of place. It is a simple thing, though endlessly diverse in its directions and changes. Has it a simple cause? The philosophic axiom of the Baconian philosophy cannot possibly allow it but one, till it is proved that more than one is needed. And as we now know that most of the apparent forms of matter are merely phenomenal, so we have every reason to suppose that most of the apparent forms of force are merely phenomenal, also. And if there are any facts, revealed by the progress of science, which would drive us from the rigorous application of our philosophic rule of simple causation in solving the phenomena of all form in matter as the result of simple elemental atoms, and of all motion and change as the equal result of simple elemental force, equally one and simple in its nature, I know not what those facts are. Why, then, is it not right to apply our rule and assume and assert its truth till we know to the contrary? Or shall we give up our rule; or hold it as dogmatists do their creeds: as a settled truth, everywhere to be asserted and proclaimed, or at least not contradicted, but nowhere to be either discussed, applied or believed—a bare, dead form of words.

Under this view of the subject, how full of life and inspiration is the study of Natural History, in all its varied departments? How manifold, and yet how sublimely simple, are all the works of God?

Only three simple things, of which to make a universe of being: angels, men, beasts and birds, earth, ocean, air; all solids, liquids, gases; all forms of beauty and deformity—of life and of death—filling all time and all eternity: *MIND, FORCE and MATTER*—the great created and uncreated Trinity of the Universe of God—producing all forms, all shapes, all sights, all sounds, all arts, all life, all death, all being, all motion, all change, all everything.

True, we call these three things by various names, as they appear before us in varied forms; but does the name change the thing? So we call water ice when it is frozen, and steam when it is heated. In like manner (it may be, at least,) that we call this all-moving force, as it glances through space, from the bosom of the sun, pure *light*. As it strikes through our atmosphere, or impinges upon the solid matters of our globe, we call it *heat*. As it

performs its mysterious and unknown circuits and offices around and within the earth, (possibly causing both its annual and diurnal motion,) we call it *gravity*, *polarity*, the *centripetal* and *centrifugal* forces—*cohesion*, *attraction* and *repulsion*, etc., etc. As it shoots, in fiery masses, from point to point, or from cloud to cloud, or trembles along wires, under oceans or over continents, obedient to the power of mind, (even in man,) we call it electricity. As it runs along the nerves or coils round the brain of men or animals, we call it galvanism, nervous fluid, etc., etc. As it slowly builds or shoots up the myriad forms of crystal, vegetable and animal life in earth, air and sky, and in the vast and capacious sea, we call it chemical affinity, animal and vegetable growth, life, etc., etc. As it finally drops all things into the charnel house of death, we call it decomposition—decay. And, summarily, we speak of all its acts, in these regards, as composition and decomposition. As it whirls along in the bosom of a storm, sweeping all things—the air, buildings, fences, trees and animals—in the same giddy whirl along with it, we call it a whirlwind; though we might as well call it a whirl-tree, or a whirl-house, or whirl-barn, or whirl-fence; for it often makes trees, houses, barns and fences whirl as lively as it does the air. While on the ocean, we call a similar phenomenon a *water-spout*, and might as well call this a ship-spout, or whale-spout, too, for it takes up a ship or a whale just as easily as it does the water. Finally, when all its earthly offices and duties are done, it seeks to whirl away toward the poles of the earth, and, like the Phoenix, rising from its own ashes, to gleam and corruscate in the Polar sky on its return back to the bosom of the sun, from which it came; and then we call it the “aurora borealis”—“the morning of the north.” But it is questionable whether this might not better be called the “evening of the north,” for it would seem more natural to suppose that here, at last, the earthly day’s work of this *mighty, all-moving force* is brought to its close.

Phenomenally, perhaps, all our varied names are well enough; just as we speak of a water-fall, a stone-fall or a tree-fall—though it is simple gravity, as we admit, that makes them all fall. And what is gravity, or electricity, or attraction, or any other form of force? Why, it is simple force, performing certain things or changes upon matter; and that is, in reality, ALL we know about it.

Simple, mighty, mysterious, all-creating, all-moving, all-destroying force—now gilding a scene; now hatching an egg or sprouting a seed; now wafting a feather or scattering a spore; and now

whirling or exploding a planet or a world—existing everywhere and doing all things—filling all space without occupying space—controlling all form, shape, color and motion, without form, shape, color or motion either—so far as we know ; for motion belongs only to matter, not to force—the right hand of God, by which He moves and effects all things—if, indeed, it be at last resolvable into anything but the naked will of God itself ; and, if so, it surely must be simple and not complex.

Perhaps we may never be able to solve this great riddle by actual demonstration. But if not, it is still, I contend, more philosophical to hold to the simplicity of nature and the simplicity of causation, and assume that both force and matter are units, rather than to assume, against all our axioms and known rules of evidence, that they are complex and varied. For the case stands really thus : We do know that some one kind of MATTER, FORCE and POWER does exist as the several causes of FORM, MOTION, and of THOUGHT and WILL. But that *more* than one kind of ultimate matter, force or power does exist we do not know ; and it is surely more philosophical to ASSUME AND REPORT ONLY WHAN WE DO KNOW than what we do not know. And to draw this line between the actually known and the unknown has been one object of this discourse—that we may see, more clearly, how little we actually do know.

And to trace and note all the varied and complex manifestations, methods, relations and phenomena of that essence of MATTER, which assumes form ; and of FORCE, which produces motion ; and of POWER, which produces thought and will, makes up the sum total of all human knowledge, both in the natural and material world, under the great law of necessary causation ; and in the supernatural and spiritual world, under the laws of free volition. The one the law of MATTER and FORCE—the other the law of SPIRIT and POWER.

This view gives a unity and simplicity to all our philosophic aims and investigations which no other view could ; and at certain points tends to shield us from errors, and even from the most gross absurdities, into which the mere book-making and book-reading world have often been inclined to fall.

The absurd confounding of matter or force, or both, with spirit and power, and the great law of *inevitable causation*, which governs the one, with the law of *free volition*, which governs the other—so common in the most learned writers, especially on metaphysics and theology—could scarcely have occurred, if this view of the simplicity of the Creator's works had been, even as a bare possibil-

ity, admitted to the mind ; for it at once dispels all the fog and dust of such confused and absurd notions, and shows us, at a glance, that a man might as well inquire after the gross weight of a thought, in pounds and ounces, as after the necessary cause of a volition—or after the conscience of a cannon ball, as after the matter of a spirit, or even of a force.

Consistently with this view, there never have been but three great leading modes of human thought in the world—called, in different ages and languages by different names, and exhibited under somewhat different phases, but each resting, substantially, on the same basis—whether in Germany or Judea—among the millions of China or India—or in the wilds of America. We commonly name these modes of thought **MATERIALISM**, **PANTHEISM** and **SPIRITUALISM**.

The first looks upon the world from the mere material or phenomenal side, and assumes the actual **SUPREMACY** of **MATTER** ; either ignoring the very existence of supernatural, supereminent mind, or making it the mere bond-slave or instrument of matter—a “*tabula rasa*,” as they say—a “clean sheet,” on which omnipotent matter registers its hourly lessons and decrees.

The second, or Pantheism, looks at the world from the side of mere force, and, regarding mind as a mere form of force, assumes its universal supremacy. And thus, having made mere force the only God, it, of course, finds God everywhere and in all things where this force exists and acts.

The first can see no force outside of matter, and the last can hardly recognize any matter even apart from force ; while both, alike, ignore the existence of mind in the highest and most proper sense of that term.

The spiritualists recognize, in some form, a **SPIRITUAL POWER**, such as I have described, and sometimes spread it over the appropriate realms of matter and force ; making spiritual beings the direct and proximate as well as the remote and original cause of many phenomena of force and of matter. Thus each of these modes of thought is based upon some one of the *three great facts in the world* ; and from hence have derived their almost incredible vitality and power over the human mind. And from each, alike, we may, as students of nature, derive some valuable instruction, which, as philosophers, we should gratefully accept, rejecting only the attendant error.

To some of the assumptions of our terminology in physics I have already alluded. But let it not be supposed that, even here,

things may not be assumed as well as words. Probably, if any one should look over the text-books of science, most in vogue with the most learned men, only some forty or fifty years since, he would be utterly amazed at the absurdities and follies which they contain. But do we not still assume that we know things which are not yet quite demonstrated? I confess I have many doubts about even our present attainments, at some points.

In Astronomy, we still talk about having weighed the globes as complacently as a farmer speaks of weighing his pigs. It is often supposed to be mathematically demonstrated, not only that we know their weight, but that they are all solid, and that their gravity is most dense at their centres. But our processes of weighing resemble that of the Indian trader, who put his foot in one end of the scale when he sold shot to the natives. In time, they discovered that it made a material difference whose foot was in the scale. So if we assume that the Earth and all the planets are solid spheres, that is one thing. But if they are, in fact, all hollow spheres, and occupied within only as vast depositories of this omnipresent and all-working force, without atoms or matter, in any form, then we have quite another man's foot in the scale; and our ponderous worlds all turn to mere soap-bubbles, dallied in the hand of that INFINITE POWER that controls matter and all force, and in whose sight the created universe itself, with all its stupendous forces and shows, is but a mere bauble—a trinket of a passing day—made for the amusement and development of MIND—self-determining and self-directing mind—a thing infinitely above all mere matter and all mere force—not only an original power, but the only such power; nay, properly speaking, the only power in the universe of God.

Again—it is supposed that the matter of the Sun and many other spheres is more luminous, in proportion to its size, than the matter of our Earth. But where is the proof? If our Northern lights are as bright as represented by Dr. Kane and others—and if the matter of our globe should be increased one million four hundred thousand times—(that is, made equal to the Sun,)—and the brilliancy of these lights be proportionally increased, who can say that our Earth would not appear as luminous, (that is, as perfectly enveloped in that force we call light,) to the distant spectator, as the Sun now does to us? True, this may not be so. But I do not think that this and many other points, apparently assumed in the books, have ever yet been demonstrated, or are soon likely to be

so; and I apprehend that we shall all, at last, find that the *uniformity* of nature, of both the law of matter and force, as well as their simplicity and unity, is much greater in all the worlds than the books are wont to admit. Who knows that our Earth, just as it now is, would not at once become a sun, simply by increasing its size—that is, simply, by giving a wider field for this force called gravity, electricity, light, Northern lights, etc., to act in, and display itself upon. According to this notion, the Sun is simply, so to speak, a greater galvanic battery than the Earth, requiring, using, giving off, and receiving, more of this force, in its varied forms, only because it is larger and needs more, and perhaps generates more. In this view of the case, there is no proof that the remotest planet in the solar system is any colder than the Sun itself; for, like the Sun, each one may make its own fire, or generate its own heat, by a law compensating for its distance from the centre.

Again—where is the proof that either light or heat is diffused through all space from the Sun, or any other sphere, by universal radiation from the centre, like the light of a candle, instead of flowing off toward, and only toward other orbs, in straight lines, as electricity moves toward the matter alone that attracts it. Candles and fires of earth throw their light all around, it may be, because the matter that it seeks, or which attracts it, lies all around. But it is not so with the Sun. And that light and heat or any form of force run needlessly and wastefully through all vacuity, all space, to my mind is an assumption which, with many others of like sort, needs proof. In this view, above suggested, all planets shine in proportion to their size and their own inherent light, and also in proportion to the light attracted to them, or poured in parallel lines upon them, from all other planets; and with us, of course, most of all, from the Sun—so that one side of the Moon gives us its own light, augmented by the influx from the Sun; and the other side, the same light, augmented only by the stream or influx from the other planets, which is very dim. Now, if the contrary of this suggestion has been proved, surely the proof is not quite as demonstrable as such assumptions in science require; and for one I would like to see the proof of a multitude of similar points assumed made a little plainer before yielding my unquestioning and undoubting assent. That this force of light, whatever it may be, is attracted toward the denser medium, or matter, we have full proof. How much it is so attracted we cannot say.

In Geology, too, we assume that these forces, or this force, ex-

ists and acts now in this way, and now in that—at one time the Earth is a bladder, full of water, and anon a bomb-shell, full of fire—one day we trip up Moses' feet, and the next day we set him bolt upright again, on a new pair of exegetical stilts.

In Physiology, we assume that this force, in the production of life, or "vital force," as we call it, acts now on one principle and now on another; and while we agree that all embryos, seeds, and beings, of whatever sort, have, in times past, been created or produced by this force, under the guiding power of God, yet we seem startled if any one suggests that the very same processes, in kind, may be, so far as needed, going on now; and that God has neither gone to sleep, nor this all-creating force become either idle or inactive. Said an eloquent one of old, "Why should it be deemed a thing incredible to you that God should raise the dead." But we seem not to have faith enough to believe that he can make a grain of chess, or clover, or purslain seed, or a new ant's egg, or fly, when he needs one—because it is against the laws of nature, as we say—that is, against the laws of the identical power and force, that made all things, and still holds them as they are. But by what logic or law of nature do we infer that that power and force which has created all things, may not create still another thing, either the same or different in kind, where it is needed. If Adam was created with all the nameless forms of vermin in and about him, which are now known to live only on the human body, he must have had a merry time of it in his new Paradise, and I do not wonder he rebelled. But if not so created, some living creatures must have been produced since the original creation. And if living things, why not seeds and plants?

In METEOROLOGY, it is generally assumed that tornadoes are caused by a vacuum, or partial vacuum in the air. Now every fire and candle produces such a partial vacuum; but who ever saw, even on the smallest scale, such motions of the air produced by these vacuums? Is not the balloon or funnel shape of the tornado, also, exactly wrong end up, to suit the purposes of this theory? or, if not—are not the movements of the air upwards almost exactly the opposite to what they should be, on any possible theory of a mere vacuum, and air rushing in to fill it. And where is the evidence that such a vacuum exists at all? The usual fall of the barometer is, of course, no proof; since any force, lifting the air and all things else upwards, would evidently produce on the barometer the same effect as a vacuum. And if such vacuum, or partial vacu-

um, is near the earth, why does it not sensibly affect the men and animals thrown into it? But who ever heard of any such testimony? To the best of my knowledge, want of air is quite the last thing any man in a whirlwind thinks of complaining about. The waterspout and whirlwind, or tornado, are usually ascribed to the same cause. But what tendency there can be in a mere vacuum, over the sea, to lift up the water, instead of the yielding air around, and thus create a water-spout, I confess I cannot see, any better than I can see its tendency to create a whale or a rhinoceros. True, if there is a vacuum there, the water might jump up to fill it, instead of the more yielding air all around; and so might the whale; and, indeed, so he would, if he was there. Then, we should have, I suppose, a "whale-spout," or a "*whirl-whale*," instead of a water-spout or a *whirlwind*. Beside, what produces this vacuum? or does it produce itself? Some force, of course, must do it. Why, then, not come right to the truth, at once, and state the simple fact, this mighty, mysterious, all-moving, all-creating, and all-destroying force, which we see at work everywhere, but know nowhere, in accordance with its own innate laws, in one of its modes of action, whirls air, seas, men, trees, temples and ships, all, **ALL ALIKE**, aloft, and thus creates a whirlwind, and a "whirl-house," ship, tree, and water, too—a "*whirl-everything*" that comes within its grasp; for this is simply and strictly **ALL** we know, as yet, about it.

Is it asked, in any case, where this force comes from? Comes from! Better, far, ask where it does not come from.

Professor Faraday professes to have demonstrated, says the *Atlantic Monthly Review*, of July, 1860, that one single grain of water contains as much of this elemental force, in the form commonly called electricity, as can be accumulated in eight hundred thousand Leyden jars, each requiring to charge it thirty turns of the large machine at the Royal Institution. If this is so, God, the Infinite Creator, is, surely, not likely to become bankrupt in an ever-present available force, either on sea or land, to make all things, at any moment, either whirl or stand, live or die, as he pleases. Doubtless, his law of volition and action will continue to be, as it ever has been, somewhat fixed and constant; and thus make for us, and for all our intelligences and sciences, that uniformity of phenomena which we are pleased (looking amazing wise all the while) to call the "**LAW OF NATURE**." But his internal resources of **POWER**, and his external magazines of **FORCE**, will not be

likely to become soon exhausted, even should whirlwinds, tornadoes and water-spouts be greatly increased, or a new seed now and then sprout and grow, or even a new animal be created; yea, whole globes, systems, and spheres, of new suns, earths, men, animals, and trees.

Then, again, there are the new (what shall I call them?) sciences, arts? truths? facts? or, diabolisms, witchcrafts and humbugs?—phrenology, mesmerism, biology, spiritualism, etc., etc. Well; I well remember the day when we students of old Yale were cautioned against phrenology, as the great antichrist of the times, and the temptation of the devil. Now the necessary position of the clergy in human society, in all ages, makes them so prone to be conservative, that they often have regarded a new thought as a temptation of the devil, (though in our times their love of knowledge is bravely overcoming this weakness of fear,) and I admit it may be so; though I think that, at least, some of the new thoughts that have come into the world under the common fate of being denounced as the children of the devil, have actually sprung from the power of God, wielding according to its fixed laws, that mighty force that moves the world, in all outward manifestations, both of matter and of mind. True, I would regard the old adage, and “give the devil his due;” but to give him everything, that is really worth giving to any body or being is a little too much. I do not think him worthy of that honor. And as he has not succeeded in running away with astronomy, geology, electricity and gravity, in olden time, I am opposed to bequeathing to him any new manifestation whatever, of either **POWER, FORCE OR MATTER**, mind, motion or atoms. Nor do I assume, that we, as yet, understand the full play and interplay, action and reaction, of mind on mind, or power on power, power on force, and force on matter, throughout the whole universe of God, natural and spiritual, so as to be able to say precisely, and most punctiliously, this old thing, which we do understand, is of God, and this new thing, which we do not as yet understand, is of the devil; for I consider it, at least scientifically, if not theologically, possible that God knows and understands several things which we do not, and are not likely to, even in this most enlightened and democratic nineteenth century. At all events, as philosophers, we shall, in this age, as in ages past, learn more by watching and recording facts, than we shall by berating the devil, ever assured that **POWER, FORCE AND MATTER**, working by their own laws, are adequate to all we see and know,

without the devil's help, except in his own appropriate work and sphere ; and I have never known him to become as yet the father of a new science or the creator of a new fact.

To inquire and examine fearlessly and critically, into these and all other phenomena, is one of the ends of this Association. In what weakness and fear it began its being, and amid what toil, and want, and poverty, it has, thus far, continued to struggle, there are some present who well know. And if its working officers and members have not literally worked for nothing and lived upon nothing, they have come so near it as utterly to spoil the remark as a figure of speech. The report of what they have done will be presented by the superintendents of the several departments.

But, my friends, why should not this society, with such success as it has already attained, and such talent and such laborers in its behalf, even though homeless and penniless, be of good heart ? Is it not the poor, ragged, frugal and hard working boy that ever makes the man ? Who now are the two prominent candidates for the highest office in the gift of the civilized world ? The one is a poor orphan and the other a poor rail-splitter. So may it be with our Association. Nurtured in poverty and want of all things, it shall yet rise through usefulness to glory ; for such is the order of nature and of God. To this end all power and all force tends ; and to this law all nature and matter must submit. Go on, then, my friends, with thanks for the past and good hope for the future. Who among us, in that first hour of our weakness—the natal hour of our Association—thought, then, that as much would be actually achieved in ten years, as has already been done in two ? and that, too, although the times have been seemingly all against us. It is true that we owe obligations to many friends, both as individuals and as associations ; to the hospitable citizens of this place ; to the guardians of the Normal School here ; and to our great State Associations, Agricultural and Horticultural, now represented here ; to the editors of the State, and to many others who cannot be mentioned—for they have all given us a hearty God-speed, and a helping hand, whenever they could. We, also, owe especial thanks to the gentlemanly conductors and guardians of our various railroads, whose generosity and patriotism ever leads them to favor a good cause, quite up to, and sometimes even beyond, the extent of their real ability. Nor should we forget that noble corps of Teachers, the Illinois State Teachers' Association, at one of whose annual meetings the first idea of this Society was suggested, and so many

of whom have coöperated and sympathized with it in all its labors and trials.

But the speaker owes to you, on the other hand, an apology, as well as thanks, in leaving again the office, with which you have seen fit to honor him for the past two years, in your hands. I frankly told you in the outset, that I could personally do but little for you ; and unexpected events have rendered even that little far less than I intended—so very little in comparison to what others have done, that I could not let this occasion pass without distinctly adverting to it. But that little has been done cheerfully—most cheerfully, and I only now crave your pardon, that it has not been more.

Go on, then, my friends, with good heart and good hope. Use **POWER**—grasp **FORCE**—control **MATTER**—and thus, as thus mortal beings only may, serve man and glorify God.

ON THE CULTIVATION OF FIELD CROPS AND PREPARATION OF SOILS.

BY PROF. J. B. TURNER.

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It can hardly have escaped the notice of intelligent practical men that our popular philosophy of agricultural growth and production is entirely too meagre and narrow, and that the cultivation based upon it must therefore fail of its proposed ends. Hence we find men who know nothing of books and theories oftentimes succeeding far better than those who know much of them; not because books are useless, but because the present theories of our books are too narrow and incomplete; they do not take into full view all, even of the essential facts in the case.

The first question is, why does plowing or cultivation of any sort tend to enrich the soil or increase the crop? What is there in the mere stirring of the soil that should produce such marked and well known results in fact? The popular idea is that it simply mixes together the ingredients already in the soil, and presents them more readily to the rootlets of the plants within the area of the ground so plowed or stirred. Nothing could be more illusory and false, for we need only to consider that more than nine-tenths of every plant grown, comes in fact out of the atmosphere, and not originally out of the earth at all, and that the roots of wheat have been known to extend downwards five feet, and those of corn ten feet, in order to see that any possible mere scratching of the surface with plows and harrows could do but little good, if that were all, or even the chief part of the benefit to be derived from it.

The real end in plowing, therefore, (aside from the mere destruction of noxious weeds, which is purely mechanical,) is to put the soil in such a condition that it may most readily and continuously absorb from the sun and the atmosphere above, the heat, moisture and other atmospheric elements, of which more than nine-tenths of all plants are composed, at the same time that it most readily absorbs or draws up from the depths of the subsoil below, by

capillary attraction, the remaining mineral ingredients of which the other one-tenth of vegetation consists. We therefore really plow about ten times as much with reference to the heat and the air, when we plow wisely and successfully, as we do with reference to either the soil or subsoil. To show the supreme and all-controlling importance of heat alone, in this process, we need only consider the difference of the same soil in productiveness here and in Greenland, or under the Equator. To show the importance of due degrees of moisture, neither more nor less, we need only compare swamps, sandy deserts and arable lands, lying in the same latitudes. To show the importance of ammonia and carbonic acid, and other ingredients absorbed from the air, we need only consider the difference between a piece of ground thoroughly pulverized, and prepared for the highest degree of absorption from the air, and the same ground trodden hard or even glazed over at its surface.

These and similar considerations must convince every reflecting mind that *heat*, *moisture* and *atmospheric absorption* from above, connected with *capillary absorption* or *attraction* from the subsoil below, are, after all, the great ends in plowing and cultivation, and not the mere preparation and mixing of the ingredients in that small portion of the soil which it is possible to stir with the plow.

There is no plant cultivated whose roots, in a good soil, do not extend entirely below where the plow ever runs; and many of them derive a greater part of their earthy nutriment from below that point; and if the productiveness of the soil was actually limited to that narrow range which the plow stirs, probably three years' cultivation would exhaust the richest soil on earth; whereas, some soils have been known to produce successive crops of grain for hundreds, or even thousands of years, without any manure whatever—as, for example, those soils about Naples.

It has been supposed that the lime and other earthy ingredients in the soil became exhausted by successive croppings, and that for want of these the soil was rendered unproductive. This may be true in some cases; but there is no reason to suppose that these earthy ingredients in our richest common soils would become exhausted in thousands of years, under any rational system of culture, even if cropped year after year. God did not make the world to wear out or run down in three or five years; and as there is a great system of *aqueous* circulation which dips the water up out of the ocean and pours it, in rain and dew, upon the lands again, to keep up a perpetual supply of moisture, so there is also a great

system of conjoint *atmospheric* and *terrestrial circulation*, which constantly replenishes the supply of all other materials on good soils, needful for vegetable growth, whenever and wherever man puts the *surface soil* under conditions favorable to their absorption and action. So that, not simply the bare clods which he moves, work with the good plowman who cultivates according to the laws of nature, but the sun, the ocean, the winds, the storms, the light and the darkness, the heat and the cold, the air with all its currents and gases above, and the earth with all its fluids and treasures beneath, all together and alike conspire and coöperate with him who works according to these inexorable laws, and against him who does not; and if the skilful plowman's plowshare does not literally move the world, still the whole world literally moves, to coöperate in the ends which it seeks to accomplish. On the contrary, it is hard for a man to spend his whole life in fighting this law of universal nature, with his bare plowshare, whether he does it according to the rules of the books, or according to the rules of his grandfather.

What, then, are these three great systems of circulation, the *aqueous*, the *terrestrial* and the *atmospheric* or *gaseous*, by which the exhausted soil is constantly re-supplied with all the *watery*, *earthy* and *gaseous* matter needful to its re-production?

When we reflect that more than two-thirds of the whole earth's surface is covered with water, and that more than half the solid globe, earth, ocean, air and all, is made up of those very elements or materials which produce all possible vegetable and animal growth, we need not be in any very great fear after all, that our watering pot will become empty, or our manure heap exhausted, if we only learn the art of applying them to their proper ends and uses.

The great system of *aqueous* circulation which supplies vegetation with water, through rains, fogs, clouds and dews, from the ocean to the land, and by the rivers and streams pours it back to the ocean again, is sufficiently well known, in its general outlines, to all, and needs no further remark here.

But the great system of *atmospheric* and *terrestrial undulation*, or oscillation, so to speak, and their incessant coöperation and interplay upon the surface soil of the globe, the one ministering to the absorption by the earth of those gases from above, out of which nine-tenths of all vegetable structures are composed, and the other

supplying from beneath, by capillary attraction, the earthy matters in solution, out of which the remaining tenth part is made, have never been as fully investigated and understood.

In describing them I shall pretend to no scientific accuracy, (for the present state of our knowledge hardly admits of it,) but only give my general impressions with reference to the present end in view.

I. The atmosphere above is in a constant undulation or oscillation, or alternate rise and fall, produced by the heated air at the surface, constantly rising, while the cooler air above descends to take its place below ; thus, as if by one everlasting series of kisses, it is constantly imparting to every square foot of the earth's surface, for its absorption, all the gaseous matter that it may contain, and which the soil may need or be prepared to absorb. Its lateral or spiral motions over and around the earth, in the form of winds, conspire also, to the same grand result.

These winds, in their regular circuits, as all know, sweep spirally and uniformly round the whole globe, coursing incessantly and alternately over every zone, frozen or burning, every continent, every mountain height, every ocean and every sea, in their great regular and periodical circuits, aside from the varied dances with which they thread their mystic mazes around every storm cloud, and every accidental or local disturbance at the surface of the earth. These great horizontal periodical sweeps or circuits of the whole atmosphere, and their attendant local dances, united with its periodical tremor or oscillation up and down, as it goes, referred to above, exactly fit the whole atmosphere to perform its special functions to agriculture, as the great *universal scavenger, irrigator and fructifier* of the globe ; to gather up from earth and sea all needful waste organized matter, where it is not needed, and deposit it again on lands where it is needed ; thus throwing it anew into the hopper of the great mill that is perpetually grinding out all forms of organized life.

Thus, by this simple and beautiful arrangement, when there is an excess of moisture, or any form of gas in any portion of the earth, the air licks it up and bears it on to some other place ; but if the excess is in the air, it as readily imparts it to the earth in the form of dew by night, and absorbed vapors and gases by day. These materials, which, as we have said, in themselves constitute more than nine-tenths of all vegetable growths, are gathered up by the air, the whole world around, in all possible sewers and

manure pits, as well as from all continents, islands, oceans and seas, and they are not likely to be exhausted.

I cannot help pausing here to say, that by a most wonderful arrangement as regards the specific gravity of water, the denser waters of the ocean are piled into ridges about the poles, which by a perpetual avalanche, or water slide of the sea, throws the warm water to the north, thus producing there an open sea, even at the poles, while it presses the colder water, with their monstrous icebergs and ice islands, to the south; thus not only equalizing all climates in respect to heat and cold, as far as possible, but setting the whole ocean itself, from its lowest depths, into a perpetual whirl of currents and counter-currents similar to that of the air above; throwing it from zone to zone, and dashing it from continent to continent, while it is swept by the winds above, which lick up from its surface whatever needed elements of growth are thus whirled up from its depths below, and bear them off again to the continents; thus by one most magnificent movement, more simple even than sublime, the ocean is kept pure for its inmates, while the continents are again enriched, not only by the waters, but by the gathered wastes which the rivers and the sewers pour into the sea. Thus God churns the ocean by night and by day, that the skimming winds may gather up its needful wealth for the plowman on the land. These scavenger winds, therefore, not only sweep every zone, and every nook and corner of the earth, but the very bottom of the sea, in quest of whatever is useless or injurious to animal life there, to subordinate it again to the service of man and beast upon the land; for the peculiar oscillating and depositing motions of the atmosphere, of which we have spoken, cease upon the sea, and occur only upon the land; it, therefore, only gathers upon the sea, and deposits upon the land, wherever the land is prepared to receive it.

The corresponding action on the part of the earth, known in its main features as *capillary attraction*, every where responds to this action of the air above; and whenever the surface soil is in a condition to facilitate the action of the one, the other is incited to action equally vigorous and prompt, and thus, this capillary attraction brings from below the remaining one-tenth of the vegetable food needed, just in proportion as nine-tenths are supplied from the air above, all other things being equal.

There is also, doubtless, what may be called a lateral capillary attraction in the soil, by which the food of all sorts is conveyed

from all sides directly to the mouths of the little rootlets of the plants.

The main object of cultivation is, therefore, self-evident. It is to keep the *soil at all times* on the surface, in the best possible condition for the *absorption* of *heat, moisture*, and the *atmospheric food* of *plants*, from above, and for the free attraction of their *earthy constituents* from the depths below.

In other words, it is to take due and constant advantage of those simple but magnificent provisions which nature has made, constantly to replenish the earth with the *heat, moisture, gases* and *fluids* indispensable to all vegetable growth, from the sun and the air above, and from the ocean and earth beneath.

This whole process of absorption and attraction resembles in its most material aspects the burning of a lamp, and may well be illustrated by it. In short, it is in itself a great burning of the earth; one part of that great everlasting combustion, by which all the processes of nature are continually carried on.

Now, in the case of the lamp, the process is set in motion and carried on by the burning, as we call it, in the air above; that is, the air is constantly circulating round the wick, and bringing its gases into near and intimate combination with it, and the oil it contains, just as it circulates round and over the surface of the earth; and by a capillary attraction thus induced, the oil is drawn up from below as the liquids are in the earth by a similar cause. Now, if your lamp wick is too hard twisted, or too slack twisted, or too coarse in its texture, or too fine and compact, or too much glazed over at the top; or if a wire or tight thread be tied around it below, so as to stop the passage of the oil upward, the burning will be impeded, or the lamp will go out, and the whole process will altogether stop; and neither the burning above, nor the attraction below can go on successfully, except when all parts of the wick that are above the oil are just right; this everybody knows. Now, what the top part of the wick is to the whole lamp and its oil, the plowed surface is to the whole field below, at least so far as all needful purposes of illustration are concerned. With this familiar simile in view, therefore, we can now intelligently search out the main defects in our common modes of plowing, and of cultivation.

They all, of course, relate to that upper portion of the field which is actually moved by the plow, and which may be defective either at its upper or under surface, or in its whole interior mass; just as

our lamp wick may be too much glazed at the top, or tied with a tight string at the bottom, or too coarse or hard, or fine and compact throughout; so in our plowing and cultivating, we may leave the upper surface too much glazed, too smooth, or too rough; or the bottom surface too hard and compact; or the whole mass too coarse or too hard, too loose or too fine, too shallow or too deep.

1. *First, the upper surface may be too smooth or too rough.* Where ground has been suffered to lie too long, especially after a heavy rain, in clay soils like those in the west, the surface becomes glazed or crusted over with a sort of smooth glassy crust, of a considerably lighter color than the same soil is when not so glazed, and sometimes almost of a pale grayish white, even in soils generally quite dark.

Now, this crusting over of the soil, as all well know, interferes at once with the processes of successful growth, but the reason why it does is not generally considered.

But we shall find that it lies in three of the most vital points: every one of which tends directly and seriously to retard all vegetable growth, especially of such plants as *Indian corn*, and others requiring great heat in the soil.

1. In the first place, this glazed surface being of lighter color, has far less power on that account of absorbing the rays of the sun than it would otherwise have, while the glassy surface constantly, from its smoothness, reflects back the rays like a mirror, and from these combined causes a vast amount of the first element of a rapid growth namely, *heat*, is daily and hourly dissipated, or thrown back into the air and wasted, instead of being absorbed into the soil.

2. In the second place, this smooth surface *excludes the free access* of the air to the interior of the soil, into which it would, from the undulatory or vibratory motion, (which I have described) otherwise penetrate, and, (by making a constant deposit of dew among its loose particles, both by night and by day, together with the ammonia and carbon, or whatever else contributes to vegetation,) thus perform its proper functions toward growth, all of which by this little crust are more or less interrupted.

3. But by thus shutting out the free access of both heat and air from above, the corresponding interplay of capillary attraction from below, is also interrupted; just as when the lamp wick becomes glazed over, the lamp not only ceases to burn brightly above, but the oil, in like manner also ceases to respond, and to run up from

below, so that by this simple glazing of the surface of the soil, every one of the three great essentials of each of these circulatory systems, and of all successful growth is at once checked or retarded, and the entire root of the plant becomes robbed of every one of its elements of life, namely, the heat of the sun, and the gases and moisture which supply its growth from the atmosphere above, and the capillary attraction which supplies, when needed, its moisture and all other needed elements from below; the mischief is, therefore, vital at every point, and its real effects any one can see by simply keeping this crust broken every day with a hoe, on one row of cabbages or other plants in a garden, and allowing another to stand glazed over week after week.

For the same reason it is injurious to ground to lie in the sun thus glazed over, whether there is any crop on it or not—that is, it will grow no better; it gains nothing, or but little, either from above or below, whereas, if the surface was roughened with a harrow, or even covered with boards or with weeds, alive or dead, so that it need not crust over, it would be constantly enriching itself, both from what it received from the air above and from the subsoil below. Hence when a long drought succeeds a heavy rain, naked fallow plowing may do more hurt than good; that is, the soil may not gain as much, either from above or below, when so crusted over, as it would have done if it had been let alone, and not fallow plowed at all. The proper remedy, of course, in all such cases alike, is simply to break up this crust, as often as it appears, either with a hoe or harrow or cultivator, or whatever is convenient. In other words if your agricultural lampwick gets glazed over, the only thing is to SNUFF IT—with your fingers, or whatever you can get hold of—for it cannot burn clear again till you do; unless indeed Providence should see fit to undertake your own proper work for you, and send along a thunder-storm to snuff it for you; which He will not always do in season, for it is not His business to snuff your candles or hoe your cabbages for you, though He may possibly do it. Better do it yourself. Attend to your business, and He will attend to His first rate—be assured of that; and on ground liable to crust or glaze over, it is your business to plow and stir OFTEN, even though it may not be very deep, and some seasons much oftener than others; and the man who has concluded to cultivate just so many times every year and no more, let the weather be what it will, ought also to conclude to wear just so many jackets every day, summer and winter.

4. But, on the opposite extreme, the upper surface may be too rough. In this case there is the same or even a greater loss of heat, especially in the spring, than before, while all the other processes are interrupted from an opposite cause. The sun's rays are caught in great clods by day and blown away by night, while the interior heat of the earth is fearfully wasted by the more rapid radiation from the rough uneven surfaces. All are aware how the light snow will melt sometimes from a smooth or rolled field in a single day, while it remains for weeks on an adjacent uneven or cloddy field. This shows us how much heat is wasted by leaving the field rough and full of clods, in the spring months, which would otherwise be absorbed into the soil and laid up to push the young corn into an early maturity of growth. For the best manure heap any corn-raiser has is the sun, the next best the air with its gases, and the rest he may find in his field below, or in his farm-yard, or wherever he pleases; but if he so cultivates as to constantly waste the power of the sun and the air, he cannot raise a first rate crop of corn, manure it as he will. Since our spring climate usually has too little heat for corn and too much for wheat, we should keep corn surfaces smooth, so as to save as much heat as possible, and wheat surfaces rough or ridged, so as to avoid it as much as possible. So, in all cases, we save heat by smooth surfaces, if they are not glazed or glassy—and dissipate it rapidly by rough ones; both that which comes from the sun above and from the centre of the earth below. Water also stands and lodges upon rough, cloddy surfaces, and thus again dissipates, in its evaporation, an immense amount of this vital element of the corn crop, for it wastes the same amount of heat to boil away or evaporate a quart of water in the field that it does in a kettle over the fire. Such rough surfaces also retard the deposit of moisture and gases from the air above, and to the same extent interfere with the capillary attraction from below, much as too much frizzling the top of the lampwick arrests all its proper modes of burning. The free and proper access of the air to the soil below is everywhere interrupted by dry clods and inequalities, which it cannot penetrate, or if so only to have its deposits blown away again by the winds; and, while the natural action is thus interfered with at the surface, that from below must be correspondingly impeded, and the whole process, either of recuperation or growth, in like manner retarded.

II, The whole mass of earth, stirred by the plow may be too deep or too shallow, too coarse or too loose, too soft or too hard.

This whole mass of earth, thus stirred by the plow, effects two ends:

First—It furnishes a proper prepared *nidus* for the rootlets of young plants to run in and seek their food, while the plant is still young and tender, and its roots extend but a short distance from their starting point.

Second—It increases the absorptions and attractions from the air above, and from the sub-soil below, as already explained.

The importance of a proper *nidus* for the tender roots of the young plant, will more clearly appear, if we consider that the inherent power of the root increases nearly as the square of its distance from the centre, and not simply as the distance; hence, when a young root has extended outward in all directions twelve inches, it has an inherent power represented by 144, while its inherent power when extended only two inches, is represented only by four. The importance, therefore, of a well prepared *nidus*, and of frequent and close cultivation near the roots of all young plants, in order to help them, and nurse them in their start, is well represented by the instinctive care of the mother bird for her young ones, or the care with which you hold your hand before the lamp just lighted, lest the flickering flame should go out; and more can ordinarily be done for a corn crop before it is six inches high than ever can be done afterwards. So far as this *nidus* is concerned, it should be remarked that all uncrushed clods or hard lumps of earth, even if not bigger than a pea, are of no more use to the roots of a young plant than so many gravel stones. They cannot penetrate them or do anything with them; for a young and tender root can neither grow in these clods or lumps, nor in the vacant air-holes around them; the consequence is that the rootlets start to grow in one direction and meet a clod at which they must stop, and take time to make an offset and shoot off in some other direction to avoid it; there again they soon meet an air-hole or another clod, and must again haul up and start anew. Thus the struggling rootlets are balked and repulsed on all sides, turning hither and thither, as freezing birds turn over in a cold nest, stretching up their bills in vain for food, till many precious hours of the early spring are past, before they can get any proper hold of the soil around them; go along now and crush these little clods and their attendant air-holes altogether, into a fine and suitable mass, and you do two most important things for the roots themselves; you liberate to their free use all the rich nutriment that is bound up in those little clods, and

you enable the tender rootlets to shoot out straight through them in all directions, without these incessant delays and offsets; and I have frequently seen even one such culture change the whole size and look of a row of young corn in a single week, so that it could be seen all over the field, and appeared in contrast with the rest as though it had been heavily manured, which, indeed, was really the fact, for what difference does it make to the young grain whether you cart on *ten* loads of manure upon your field from abroad, or crush up and liberate, and put to its proper uses, *twenty* loads that are already there, at the same time that you take these other obstacles to the young roots out of their way.

Second—But this effect of the proper fineness of the mass of the plowed soil, by crushing or otherwise, great as it evidently is, is not its only effect. It also increases and facilitates in an equal degree all those absorptions from the air above, and those attractions from the subsoil below, of which we have spoken above; and thus again sets all those vast circuits and economies of the sun, the earth, the ocean and the air into harmonious coöperation with the rejoicing farmer and his triumphant plow.

The mass of earth thus stirred may be too *deep* or too *shallow*. In soils like our rich black prairies, which abound in *humus*, which has a great absorbing power, if the farmer wishes to raise wheat or oats, if he plows or stirs it too deeply, he will so increase its absorbent and prolific power that his wheat or oats will all run to straw, they say; that is, they will grow too large in the fore part of the season, and fall down and blight before the time of ripening. So, everywhere in nature, we may have too much of a good thing; too much learning has made many a man mad, though it did not make Paul so; and thus too much or too deep plowing will sometimes defeat the end of all plowing. God presupposes that every man will have common sense, and adjust all his methods and all his processes to the particular end he has in view, or the particular crop, and the particular soil he has to cultivate. Hence, when a man on our barrens writes or says that deep plowing is the best in all cases, even for wheat and oats, the man on the prairie need not run mad, and stick his plow in up to the beam in cases, because his neighbor has found it good to do so. Let every writer tell us what his location is, his county first, and what his soil is second; and then we can judge whether it is proper for us to follow his methods or not, and let him know that if he writes the sky over, he can give us no practical information for our use till he does that.

Some soils need to be plowed to the beam all the time ; others need it for some crops, not for other crops, and some few do not need it at all, their natural absorbent power will produce as great a crop as can grow and stand upright in the field, and that is enough ; and what use is sweltering both man and beast to do work to no profitable end, except some one in the newspapers has told us that he does so and so. Where does *he* live ? and what is *his* soil ? These, and these alone, are the vital questions to us, and perhaps the only questions whose answers he withholds. It is wisely ordered that every man shall be compelled to study his own particular farm, and not take on trust all his neighbors say.

Great and *eternal principles* affect us all alike ; their wise application can belong only to the particular man. It is therefore wisely ordered that the intellect of the race combined should search out the one, and that on him alone should be thrown the responsibility of the other.

The depth to which any man should plow for any particular crop can be determined wisely only by himself. To revert to our standing simile : the depth of plowing is analogous to the height of the wick in the lamp. If a man, then, wants more light, let him raise the wick of his lamp, so that the flame will take hold of it deeper down ; and if he wants less, let him make it more shallow. So if he wants a greater bulk of crop in any one case, let him plow deep ; or if he wants a less bulk, let him plow shallow, and according as he adjusts his wick in the field with his plowshare, all other things being equal, so will the flame of his crop be either light or heavy ; and the fineness of the wick of the lamp is of more vital importance than the mere depth to which it is made to burn, so there can be no question that the same *fineness* is of more consequence than bare depth of plowing in the soil.

It may be laid down, then, as a universal principle, that no soil can be crushed too fine within a given depth for any crop whatever, while it is usually left far too coarse for all crops. The importance of this simple element of comminution or fineness will appear if we consider that there are soils of very fine sand in Ohio which bear splendid crops of corn annually, which are, by chemical analysis, exactly similar to other soils of coarser sand in the East, which will hardly bear anything at all ; and precisely the same chemical ingredients which compose our present prairie soils may be found everywhere on rocky mountain heights, which will produce nothing but the bare mosses. And still further, I have seen old fields in

Morgan county, which had been wadded up with simple steel plows and the yearly tramping of teams and horses into clods and balls of earth till they would not, under the same culture, produce forty bushels of corn per acre, and were thought to be worn out, but by making the soil fine and deep again, they produced, by actual measure by the State Board of Agriculture, from one hundred even to one hundred and thirty bushels per acre. All are aware of the successful experiments of Jethro Tull and others, in England, who inferred that a due degree of pulverization of the soil by plows, harrows and rollers, was all that was needed to secure its perpetual fertility in the same crop year after year. And in some soils, like those around Naples, and like many of our soils in Illinois, where there is a rich, deep subsoil, this theory would prove true for thousands of years, while on a shallow subsoil, like that of England, where it was tried, it in time necessarily failed, for if your lamp is but two inches deep, it cannot burn without replenishing as long as you live, of course. Were it not for a seeming egotism, and want of space, I would here detail my personal experience in this line with a piece of land that has been in constant culture for thirty years under the plow, and for the last ten years under an annual cropping of a kind that is usually supposed to utterly exhaust the richest soil in two or at most three years, and yet I confidently expect a better crop the next year, in the same line, than the last, simply because I have prepared my ground better, though without a spoonful of manure. It makes no difference how this fineness of soil is secured—whether it be done with rollers and harrows and plows in the spring, or during the culture of the crop throughout the summer, or whether it be done by fall plowing, (on soils which will not run together,) and the snows and frosts of winter be trusted to do the work; or whether the field be laid down to grass, till the fine, piercing grass roots, working at it during the moist springs and falls, penetrate into every clod, and thoroughly disintegrate it, till it will again boil up before the plow, as it moves along in the furrow, like a kettle of boiling plaster of Paris—either of these ways, or any other way, to get the soil FINE, will at once set all of these great processes of absorption and attraction into operation again, on good land, with a good, deep subsoil, with the same power as when the land was first plowed, or if the soil be covered with manure or ashes, the alkalies and acids of which will eat it into fineness to some extent, as well as add both to its absorbing and nutritious power by their own presence, it is all well.

If the work is only done, nature does not stop to inquire how it is done, or who or what did it; she simply makes her own deposits in the bank thus prepared, more or less, and goes on, asking no question for means sake nor "for conscience sake." It is self-evident, however, that on these soils, when there is an actual exhaustion, with no subsoil below for a further supply, the crop can only be recruited by manures—just as your shallow lamp must be filled if it has actually burnt out. It is equally evident, also, that the cheapest way of fining an old cloddy field is either to fall plow it or to lay down to grass for a year or two, when the ground can be spared for that purpose, which will effect the end more perfectly and cheaply than any practical process of art by harrows and rollers, as all know who have tried it. But I have no idea that one-half the soils that are supposed to be exhausted in the West, are exhausted by anything but the ignorance and shiftlessness of their cultivators, and a new plowman would revive them at once. And some of those who have read books on this subject are only a great deal more ignorant, practically, than they probably would have been if they had never read anything, for the books themselves have no broad and just comprehension of the true philosophy of the whole subject; it is only an everlasting dabbling in mere isolated details—like setting up one or two single finger-boards to guide a man out of a labyrinth a thousand miles square.

But, although the mass of the soil plowed cannot be too fine or too much comminuted—at least by any process of art—it may be too loose and puffy, too full of air, for each of the purposes mentioned, both of the roots and of the processes of absorption; and land new plowed, without rolling, is very apt to be so, especially if plowed till it is fine, or if designed for wheat. Hence we so often see the best corn and wheat on the headlands, where the teams have tramped it most. This is both because their tramping has made it fine in quality—that is, it has broken up all the lumps and clods, as the roller would have done—and has also made it properly compact, instead of leaving it light and puffy and full of superfluous air; for if the soil is too light and porous and open, even if fine, the air will pass into it too freely and dry out again all its deposits of moisture or gas as fast as it makes them, while all other processes from below will be interrupted from the same cause, for neither absorption nor capillary attraction can go on where the materials are too coarse or too loose and open, or too close and compact, no more than a lamp can burn with a wick made out of

tow shives and chips, or of untwisted cotton, or from a pine board. Simple *FINESS* and *COMPACTNESS* is what is wanted, both in the plowed wick of the field and the burning wick of the lamp, without either *COARSENESS*, or *HARDNESS*, or *LOOSENESS*. Hence the winter's frosts and snows put many soils, plowed in the fall, into the best possible trim for a crop. Others, which run together more freely, they leave too hard, and they will need plowing again in the spring, and perhaps rolling, too, if found too lumpy or puffy.

Whether, in *subsoiling*, the bottom furrow should be left below, or thrown to the top, depends wholly on the season of the year and the nature of that subsoil. It is seldom well to throw much of a subsoil that has never been stirred to the top in the spring of the year, for it will rarely become sufficiently fine and rich in its texture to answer well the purposes of a surface soil, till it has been exposed to at least one winter's frost; and some subsoils are totally unfit ever to be brought to the surface, except by slow degrees, and should be left, therefore, at the bottom. But some subsoils, so-called, are exactly of the same character as the soil above, and in that case, of course, it matters not which is at the top.

Underdraining is a sort of short hand way of virtually plowing the ground three feet deep instead of one foot or less, for by reducing the general water level in the soil, especially if inclined to be wet, and by the action of the water trickling through its pores, it increases its power both of absorption and attraction, much as a very deep plowing would do; and all such methods of permanently deepening the power of the soil cannot be too highly commended to all those who have the means and the tastes for such outlays.

III. I have thus spoken of the chief defects of the upper surface of the plowed field, and in the mass of the land stirred. I come now to speak of the defects at the bottom of the furrow slice, which are almost universally overlooked, and are still of the utmost importance. They relate mainly to two points: *First*, too great a degree of *hardness*, amounting, in some cases, to an almost absolute impenetrability; and, *second*, too little *facility of drainage*.

Suppose a man, on a close adhesive soil, naturally inclined to pack and bake hard under any pressure, like most of our soils at the West, has intended to plow his farm well, and has actually done far better than most of his neighbors. Suppose he has plowed it year after year, for twenty years, full six inches deep; every year the sliding of the heel of his plow, and the tramping of his horses in the furrow, year after year at the same depth, in all sorts

of weather, wet and dry, has plastered down and tramped down the subsoil at that depth, until it is now about as hard as the bottom of an iron kettle—and if he had taken his farm to the foundery and got a cast-iron bottom put in it six inches below the surface, it would hardly have been in a worse condition than it really is; the poor man avers that he has always plowed deep, (which is true,) and still he gets but small crops. Now let him be persuaded to set his plows only two inches deeper, and rip up this cast-iron bottom—and by this time it has got so hard that, on some soils, it will probably take an extra span of horses, if not more, to do comfortably even that—well, what is the effect, and what is the cause? Why, the effect can be told in two words—a *fine crop*. But the cause is said to be that he has brought into use simply two inches more of soil. It is all fudge; he has, in fact, brought into use perhaps twenty, perhaps one hundred, feet more of soil. On his old “*cast-iron*” plan, it is true, that the roots of his crops would in some way contrive to struggle through the hard pan that he had thus created, or he would have had no crop at all. But the nice and more delicate capillary attraction from below, which a single straw can interrupt, could not get along with it so well; this could not burst through the bottom of that iron kettle until he broke it anew with his plowshare, though from his good culture above it struggled manfully to do so. It did all it could to help him, recognizing his real merit, but it could not do it till at last he helped himself by setting his plow a little lower and doubling his team, then away goes his cast-iron under crust, and up come the substantial riches, not of two bare inches, but it may be of twenty feet, or even a hundred feet of subsoil. That man has “struck a lead,” as the miners say, and ten to one if he don’t run his deep plowing hereafter clean into the dirt, and swamp all his oats and wheat in the process.

This case of a hard-pan, either natural or artificial, is analogous to that of a tight thread or wire wound around the lamp wick below, and stopping the capillary attraction upward.

2. The next fault of the bottom of the furrow-slice is want of drainage. Now, surplus water, as we all know, is a great evil, especially in some spring seasons in Illinois, when it cannot stop to rain, but must pour all the time, Sundays and all. If we pour water on the table or floor, we observe that it will literally, to a certain extent, pile up before it will begin to run at all, even when

there is nothing in its way. But if we make or mark a crease, or lead, however small, with the finger or a knife, it will immediately begin to run off. But most of our plows cut the bottom of the furrow-slices perfectly level, like the table or the floor, and make no leads, or crevices, or drains, by which the surplus water can begin to run away; the inevitable result is, that on wet lands, and in wet springs, it stands and soaks, and steeps, day after day, and sometimes week after week, till it is literally boiled away by the heat of the sun, thus taking all the proper natural heat out of the soil, which should have been reserved for the crop, as well as flooding both the field and crop with an utterly unmanageable quantity of surplus water. Now, suppose that instead of this awkward arrangement, the plow should be so constructed as to make a proper drain in the bottom of each furrow to lead the water off; and suppose that each such drain should draw off but a single barrel of water in a wet time, in twenty-four hours, then in each twenty-four hours we should ordinarily get rid of two hundred and forty barrels per acre and save to our crops precisely the amount of heat from the sun per acre which it requires to boil away two hundred and forty barrels of water, besides securing the comfort and convenience which work on drier land always gives to man and beast, in addition to the increase of the crop.

Now, all know what a splutter the lamp wick makes when surplus water gets into it, and how all its functions are stopped at once. It is true your standing or surplus water on the plowed field makes less fuss, but only because it induces at once the paralysis and stillness of death, and these great processes are all as fully stopped for the time as they are on the surface of the sea, as heretofore explained.

The practical result of these principles will be that a man should plow deep or shallow, according to the nature of his soil and the crop in view; generally deeper on compact barren lands than on rich black prairie soil; generally deeper for corn than for small grains, especially on rich black lands, and always as light as possible when the main object is to kill grass or weeds, as after harvest on stubble lands. But if a crop of corn is to be put at once upon grass land, *trench plowing*, either with a Michigan double plow, or with one team after another, is needful, if not indispensable. On wet or flat lands the ground should be plowed in narrow lands, so as to convert the dead furrows into natural drains, if the ground is not underdrained, as the loss by standing water is much

more than the loss by the dead furrow, though made deep year after year; especially in such ridging, preceded by deep plowing, as deep as possible, under the trees on the crown of the ridge, indispensable for orchards and fruit yards on flat lands, though underdraining is still better. In plowing corn, the first plowing, after the harrow or roller, should be as deep and close to the roots of the young corn as possible, but NEVER near enough to cut them; for nature never gives any more roots than are needed, and though the cutting the roots may not lessen the amount of fodder or stalks, it surely will that of the corn. Never cultivate more than half the same row at once, unless you take the whole of it, as all modes of lapping the culture in the middle of the row are just so much waste power of the team. If thorough or double culture is given anywhere, it should be close to the corn, where it will do some good, and not in the middle of the row, where it can do little or none, except to waste the strength of the horse for nothing.

In *all possible cases* make the ground *fine* and *free from water* as possible, at whatever depth plowed, either by plowing in the fall or winter, so that the frosts may fine it, or by rollers, draggles, harrows, or whatever else can be made to do it most effectually. And the more frequently and thoroughly such crushing and pulverizing processes are repeated, whether the crop is on or off, the better will be the crop; for, as we have seen, *pulverization—finess—*is more important to these great processes of nature than depth, or any other single item. Hence bar-plows, though the best of all instruments for killing weeds in corn, are the worst of all for the cultivation proper of the soil, for, in fact, they do not cultivate cloddy land at all, they merely roll it up in the sun and make it more cloddy than it was before, and often lay bare and cut the roots of the young corn so as to diminish the crop from ten to even twenty bushels per acre, while still the stalks grow well. Some form of the double shovel plow, either for one horse or for two, will always, in common seasons, give more corn to the acre with less labor than any other mode of cultivator or plow that I have ever seen, for it leaves the ground *deeper, finer, smoother* at the surface, and better *drained*, and therefore better prepared for *heat, attraction, absorption*, and for a *nidus* for the roots of the young corn. Frequent culture, so as never to allow any crust or hardness on the surface, is also of more consequence than even deep culture, for reasons explained above. I will not say what instruments I think will secure all these ends better, and with less labor for man and

beast, than any other, for my business is now principles, not implements ; but I will say that whatever implement, or theory, or mode of culture, however fashionable or popular now, that is not based upon the principles which I have thus (though very imperfectly) attempted to explain, is destined soon to go under, for these great principles will live as long as the sun shines, or the dew falls, or the water runs into the sea ; and if we fight against them, we fight at once both God and nature, and shall not be likely to succeed ; but if we would at once conform all our implements and processes to them, it is my firm conviction that the same labor of man and beast, in Illinois, would produce at least double the crop we do now.

And now, my friends, I care not whether I or any one else can mathematically or scientifically demonstrate one single thing I have said to you, or whether mere theoretical and philosophical men receive or reject these principles, I still believe that they are substantially true, and I know that if you work upon these principles *you cannot be greatly led astray in the PRACTICAL RESULT*. And if I can, by any means, lead you to think and to feel that when you are plowing you are not simply turning over dry clods of dirt in the field, but that you are plowing the sun—plowing the ocean—plowing the air—plowing all the heights above and all the depths below, and that if you plow rightly all these will at once respond to your work, I shall have accomplished all that I have sought, both for your agricultural and mechanical and your mental and spiritual good. Weary plowman ! look outward and upward, then, from thy toiling furrow, and bless anew the day when thy God said unto thee, “In the sweat of thy brow shalt thou eat thy bread.”

HISTORY AND CHARACTERISTICS OF GALLOWAY CATTLE.

BY SANFORD HOWARD.

[From the Report of the Secretary of the Michigan Board of Agriculture.]

The breed of cattle known as the Galloway, may be said to be indigenous to a section of country known by that name, in the southwest of Scotland, embracing the counties of Kirkcudbright, Wigton, and portions of Dumfries and Ayr. It is a breed of great antiquity, and on account of its various excellencies is sedulously preserved in its purity, and is not likely to be displaced by any other in its native district. Of its origin little can be said. It bears considerable resemblance to the breed of the Hebridean islands, commonly called the West Highland breed, the most striking difference being that the Galloways are without horns and the Highlanders are horned. There is, to be sure, considerable difference in size, the Galloways being larger, but this is readily accounted for from the more favorable circumstances under which the latter are reared. The characteristics of the Highlanders are so marked and distinct, that they have been taken as the type of a family of the ox tribe, and some writers consider the Galloway as merely an offshoot from the original stock, modified by the influences of climate and food.

Others attempt to trace the Galloway to what is supposed to be the remnant of a wild race—*Bos scoticus* of some writers—kept for many years past in the old Cadzow or Chatellerhault Park, belonging to the Duke of Hamilton, Lanarkshire, Scotland. These cattle, like those kept in Chillingham Park, Northumberland, England, are in a semi-wild state, though they have been for hundreds of years restrained in their liberty by fixed bounds. There has been much speculation in regard to these cattle. By some persons they are considered as descendants of the aboriginal stock of the country; others believe them to belong to a domesticated race introduced by the Romans nearly two thousand years ago, but which,

being allowed to roam at will in the uncultivated districts of the country, became wild.

But it is proper to observe that from all the knowledge we possess of these cattle, there has always been a marked difference between the two herds of Chillingham and Chatelerhault. The former are uniformly horned, and except in their color—white with red ears—bear a striking resemblance to the Devon breed. The Scottish “wild kye,” as they are called, are larger than the Chillingham cattle, and there have always been polled or hornless ones among them. The color of the two herds is not the same. Though that of the Scottish herd may be said to be generally white, it is not so clear a white as that of the Chillingham stock, and instead of red muzzles and ears, those of the former are black, their tongues are black, and they are usually flecked with black on the forearm and lower part of the shoulder. Some of the earlier accounts of them state that the cows were generally without horns and the bulls frequently so. The number of hornless ones seems to have decreased of late, probably from the fact that horned bulls only have been kept for propagation. Still, when the writer examined this herd, consisting of about eighty head of a breeding age, a few years since, several polled cows and one steer were noticed. The aged bulls had horns of medium length and size. As to color, it may be said to be somewhat variable, calves that are “off the markings” being not unfrequently produced. The keeper informed me that there were every season some calves of a spotted black and white, and occasionally those of a wholly black color. These are always killed at an early age. It is contended by some that these out-croppings of black, as well as the absence of horns, indicate an affinity between this stock and the Galloways, the color of the latter being almost uniformly black, of late years, though it was formerly varied with red and brindled, and on some animals with patches of white.

That part of Cadzow Park in which the wild cattle are kept, embracing about one thousand acres, is called “The Oaks.” On it are numbers of ancient oak trees, of massive size, and of an age computed at about one thousand years. They are regarded as the remains of the old Caledonian Forest, which according to early records once covered a great extent of country. In remote times, as tradition and history inform us, wild cattle ranged this forest unrestrained. Sir Walter Scott, in an unfinished poem, descriptive of Cadzow Castle and its surroundings, as they appeared in former

days, alludes to the noble but somewhat perilous sport of hunting these cattle, as follows :

“ Mightiest of all the beasts of chase
That roam in woody Caledon,
Crushing the forest in his race,
The mountain bull comes thundering on.”

But it is impossible to say how far the Galloway cattle are allied to this semi-wild race. There is no doubt, however, that they are a very old breed. It is true that some writers speak of *horned* cattle having occupied portions of the Galloway district many years ago ; but the most reasonable inference from this fact is merely that the polled breed has supplanted a horned one. Culley, in his “ Observations on Live Stock,” written in 1783, speaking of the Galloways, says :

“ I found that the generality of breeders were against crossing with Mr. Bakewell’s, [alluding to experiments in crossing the Galloways with the Bakewell Long-horns,] or any other kind of cattle, believing that their *original polled breed* had already been injured from crossings. Though the generality of their cattle are polled, yet they have those with horns, which they say are a bastard or mongrel breed from crossing with Long-horned bulls from Westmoreland and Cumberland. They prefer the polled ones, and of these the black or dark-brindled ones, to any others, and *allow them to be the original breed of the country.*”

The Galloway breed belongs rather to the mountains than the plains, though the district which they occupy in Scotland may be said to be intermediate between the Highlands and the warmer and more fertile Lowlands. In hardiness and ability to stand rough weather and rough fare, they are excelled by no cattle, except the West Highlanders. Their hides are thick, but mellow and elastic ; their hair is very thick and much longer in winter than that of the English and most other breeds. Thus they carry a natural protection of which cattle belonging to milder climates are destitute. They are seldom sheltered in Scotland, although the frequent cold storms of winter could scarcely be endured by cattle of ordinary constitutions. Obligated as they often are to sustain themselves through the most inclement season of the year, on coarse and frost-bitten herbage, occasionally covered with snow, they are sometimes reduced to a low condition at the beginning of spring, but they improve very rapidly as the new grass comes on, and soon become fit for the butcher.

It may be here remarked that a very erroneous idea prevails in this country in regard to hornless cattle in general. Many people insist on calling every "muley," or no-horned cow or ox, a *Galloway*. They seem ignorant of the fact that there are several breeds of hornless cattle. In Scotland there are, besides the Galloway, the polled Angus and Aberdeenshire. These, however, have more or less affinity with the Galloway, though the latter is always placed in a separate class at the shows. In England there are the Suffolk and Norfolk polled breeds, and there was formerly the polled Yorkshire, a variety having in most respects the chief characteristics of the old Yorkshire Short-horns. In this country polled cattle are frequently seen which, except in the absence of horns, have few or none of the points of either of the varieties above named, though they generally have more resemblance to the Suffolk or polled Yorkshire than to any other. Specimens of these last named breeds were several years ago imported to this country.

In regard to the question sometimes asked, whether the Galloway should be considered the parent of all the polled varieties except the wild cattle of Cadzow Park, we may say that it does not seem probable. At least, there must have been a very great degeneracy in some polled stock, if it ever sprung from the Galloway.

As showing the points and qualities of the Galloway breed, the following British authorities are referred to :

"They are," says Youatt, "straight and broad in the back, and nearly level from the head to the rump. They are round in the ribs, and also between the shoulders and the ribs, and the ribs and the loins. They are broad in the loins, without large projecting hook [hip] bones. In roundness of barrel and fullness of ribs they will compare with any breed, and also in the proportion which the loins bear to the hook bones or protuberances of the ribs. Rev. Mr. Smith, author of the survey of Galloway, says : 'When viewed from above, the body appears to be beautifully rounded like the longitudinal section of a roller.' They are long in the quarters and ribs, and deep in the chest. The slightest inspection will show that there is less space between the hip and hook bones and the ribs than in most other breeds—a consideration of much importance, for the advantage of length of carcass consists in the animal being well ribbed home, or as little space as possible lost in the flank.

"The Galloway is short in the leg, and moderately fine in the shank bones—the happy medium seems to be preserved in the leg, which secures hardihood and a disposition to fatten. With the same cleanness and shortness of shank, there is no breed so large and muscular above the knee, while there is more room for the deep, broad and capacious chest. He is clean, not fine and slender, but well proportioned in the neck and chops; a thin and delicate neck would not correspond with the broad shoulders, deep chest, and close, compact form of the breed.

"The Galloway is covered with a loose, mellow skin of medium thickness, and which is covered with long, soft, silky hair. Even on the moorland, where the cattle, during the greater part of the year, are fed on the scantiest fare, it is remarkable how little their hides indicate the privations they endure."

In regard to the purity and fixed character of the breed, the same writer observes: "There is, perhaps, no breed of cattle which can more truly be said to be indigenous to the country, and incapable of improvement by any foreign cross, than the Galloway."

A similar remark is made by Prof. Low. The breed of Galloway," he says, "is peculiarly confirmed in its character, and thoroughly adapted to the condition of the country. * * * It would be a retrogradation in improvement to attempt a mixture of blood with a race so long acclimated, and so excellent in itself, as that of Galloway. The great advantage of having a breed possessing a uniformity of characters, is manifest in Galloway, as in every country where a fixed race with determined characters exists. The breeder has always, in such a case, the assurance of being able to reproduce in the offspring, the character of the parents; whereas, in countries where no uniform breed has been established, he never can be so assured of the result of coupling animals together. The cattle of Galloway, though they have all the characters of resemblance which constitute a distinct breed, yet vary greatly in size, according to the fertility, natural or acquired, of the farms on which they are reared, showing the importance of providing an increase of food for the animals when grow in bone and muscle."

It is easy to understand, bearing in view the characteristics of the Galloways, as above described, why all attempts to improve the breed by crossing it with others, have proved unsuccessful. Allusion has already been made, in a quotation from Culley, to a cross tried with Bakewell's variety of the Long-horns, and it appears that at a

later day similar trials were made with the Short-horns. Prof. Low, in allusion to these trials, says :

“Efforts have, from time to time, been made to cross the Galloways by the Dishley Long-horns, the Ayrshires, and the modern Short-horns. These attempts, it is believed, have all been failures, in so far as they were designed to improve the general breed of the country ; and modern breeders, with better knowledge, have turned their attention to the improvement of the existing race.”

Youatt, in reference to the same subject, remarks that the Short-horns, have, in many instances, improved the stock of districts where they have been introduced, but have failed in Galloway. “They have,” he says, “at least in the first cross, produced manifest improvement, although the advantage has not often been prolonged much beyond the second generation ; but even in the first cross the Short-horns have done little good in Galloway, and as a permanent mixture the choicest southern (Short-horn) bulls have manifestly failed. The intelligent Galloway breeder is now perfectly satisfied that his stock can only be improved by adherence to the pure breed, and by care in selection.”

Lawrence, whose “Treatise on Cattle,” was written about the commencement of the present century, observes : “It is not improbable that there were only two original species (breeds) of neat cattle in Scotland, those common to the islands and the mountain country, called Kyloes (or West Highlanders), in color, black, brindled, dun, red—the black being the favorite color in Scotland—and the polled breed, chiefly confined in later times to the district of Galloway, and known by that name. The former the smallest and most hardy breed known in this island (Great Britain), and apparently the same with that of the more northern countries, may be seen at this day in its original purity, no motive existing for crossing a breed so perfectly adapted to the severity of the climate and scarcity of keep. The original polled cattle were of the same colors, but more varied, and considerably larger in size.

“Among the common run of Galloway cattle, we sometimes find them white-faced and pied, with small grizzly horns, undoubtedly from a mixture with Dutch or English Short-horn ; but this cross is said to detract twenty per cent. from the worth of a beast. As to form, the true Galloways are broad in the shoulders, long and round bodied, yet deep, straight, and broad on the back, with a thick, shaggy coat ; the legs of middling length, with large feet.”

The "British Husbandry," vol. 3, under the head of Reports of Select Farms, gives a report on the "Netherby Farm," in the county of Cumberland, a hilly and mountainous district. The report, which was drawn up by the superintendent of the farm, states that the Galloways are the cattle preferred there, after repeated trials with several other breeds, including the best improved short-horns, "*of the stock of Messrs. Collings, and other celebrated breeders.*" Of the Galloways it is said: "They possess many advantages, as they can at any time be brought to market. Their hardy and very healthy habits fit them well for the climate and soil of Cumberland; and although the cross with the short-horn does produce a good beast, no good breeder would choose to continue his stock from these crosses."

Mr. Stephenson Scott, formerly of Washington, D. C., a gentleman distinguished for his knowledge of stock, and author of a series of very interesting letters published several years since in "Skinner's American Farmer," with the signature of "Albion," has spoken highly of the Galloway cattle in a communication headed "Provisions for Exportation," published in the Report of the Commissioner of Patents for 1844. Mr. Scott had been, in England, a breeder of Herefords, to which he gives the preference over any of the *English* breeds, as *beef cattle*, but in concluding his article, he observes: "I am inclined to think that some of the Scotch cattle are better calculated for our country than any of the large English breeds, and particularly the best polled Galloway cattle. They, like their countrymen, are hardy and thrive almost everywhere; and these cattle are large enough for all purposes and pastures."

The London "Farmer's Magazine," in an article describing the show of the Highland Agricultural Society at Dumfries, in 1860, says: "The Galloways, as a distinct race, are by far the oldest breed of stock in the United Kingdom, tracing back, pure and unalloyed, even so far, it is affirmed, as the commencement of the seventeenth century. They look, too, just the animals for a rough, bleak district; long, low, and active, with rough, black and tan coats, and plenty of thick, curly hair. The bulls have somewhat bullet 'nigger' heads, with every sign of vigorous constitution, and thorough capability to cope with the climate. But the Galloways die well for the butcher, and many of those exhibited at Dumfries had fed and furnished as even as could be. The symmetry of outline was, in many animals, very perfect, and whether they have been im-

proved up to their present form, or have only kept to it, there is no kind of beast the Highland Society should be more careful in encouraging. Not, however, that the necessity for any such official countenance is very imperative; the farmers of the district have been very true to them, and 'the sign' they made on Wednesday showed how much good stock they must have to fall back upon."

The flesh of the Galloways is of very fine quality, and commands a higher price per pound in the markets of England and Scotland than that of any other breed, except the West Highlanders and the cattle of the Shetland islands. From the cylindrical form of the carcass, the "Galloway rib" is well known in the London market. Culley, to whom reference has previously been made, remarks of the Galloways: "Few or no cattle sell so high in Smithfield (London) market, being such nice cutters up, and laying the fat on the most valuable parts; and this is a great excellence in all feeding cattle. It is no uncommon thing in this refined market, to see one of these bullocks outsell a coarse Lincolnshire ox, though the latter may be the heaviest by several stones weight. I was told by a Lincolnshire grazier that a Lincolnshire bullock and a Scotch bullock, sent from the same village at the same time, were sold for exactly the same money, though the Scot was only half the other's weight."

The trade in stock from the district of Galloway has been very extensive for more than a hundred and fifty years, large numbers of cattle being annually sent to the English markets. Prof. Low says: "It is computed that upwards of 20,000 head are annually exported from the district. Their average dead weight at three years old may be reckoned at 45 stones of 14 lbs. to the stone (630 lbs.); those sent to London weigh from 55 to 60 stones (770 to 840 lbs.)." These weights are for the four quarters, or meat only.

It will be admitted that these are good weights for three-year-olds, many of which are only grass-fed. Selected and well-fed specimens of the breed of course attain a much greater size. Youatt gives an account of a Galloway heifer called "Queen of Scots," bred by Mr. Mure, of Grange, near Kirkcudbright. The following were her proportions: height at the shoulders, 5 feet 2 inches; length from nose to rump, 10 feet 4 inches; width across the hips, 2 feet 6 inches; across the middle of the back, 3 feet; across the shoulders, 2 feet 4 inches; girth of leg below the knee, 8 inches; distance of breast from the ground, 1 foot 3½ inches;

width between the fore legs; 1 foot 5 inches. Her dressed weight at four years old, was 1,520 lbs. She was exhibited at the Smithfield Show, and her portrait engraved under the sanction of the Club.

But even this fine animal has lately been excelled by another specimen of the breed, This was a heifer bred by the Duke of Buccleugh, and fed and exhibited at several shows by Mr. M'Combie, of Tillyfour, Scotland. She was first exhibited at the Birmingham Fat Stock Show, in 1861. She was then four years and ten months old, and her girth, though said not be her strongest point, was 8 feet 9 inches. She took, on this occasion, the prize of £10, as the best Scotch cow or heifer; the Gold Medal as the best of all the cows and heifers; the Silver Cup of 25 guineas as the best beast in the yard; Simpson's cup of 50 guineas as the best animal fed on his cattle-food; and the Silver Medal to the Duke of Buccleugh, as her breeder. The week following she appeared at the show of the Smithfield Club—which for a period of nearly seventy years has been the greatest fat stock show in the world—where she took the first prize of £10 as the best Scotch polled cow or heifer, with another silver medal to the breeder. At this show a Short-horn cow, which she had beaten at Birmingham, was placed before her—an act which was strongly censured by the press and public opinion. The Galloway went on to France, and at the International Show of Fat Cattle at Poissy, she took the first prize of £40 and the Gold Medal as the best cow or heifer in the Scotch class of polled cattle. She was afterwards sold to a Paris butcher—Mr. M'Combie realizing for her, by sale and in prizes, a sum equal to a thousand dollars or more.

When this heifer was at Birmingham, she was spoken of by a writer for the Farmer's Magazine, as a "wonderful" animal, "almost on every point, perhaps, as perfect a fat animal as ever was shown. Short on the leg and deep in the frame—wide before and square behind, long in the quarter, and famously let down to her very hock—with a fine countenance and expressive eye—a beautiful coat and the most mellow of touches."

After Mr. M'Combie's success with this heifer, and a similar triumph with a polled Aberdeenshire ox, a public dinner was given him in Aberdeen, "in acknowledgment of his eminence as a breeder and feeder of the black polled cattle." In some remarks made on this occasion, Mr. M'Combie said:

"I was led by a father whose memory I revere, to believe that

our polled cattle are peculiarly suited to our soil and climate, and that if their properties were rightly brought out, they would equal, if not surpass, any other breed as to weight, symmetry, and quality of flesh. I resolved that I would endeavor to improve our native breed. I have exerted all my energies to accomplish this purpose. For many years I was an unsuccessful exhibitor at the Smithfield Club Shows. I went to Baker street, (in London, where these shows were for some years held) I minutely examined the prize winners; I directed my attention especially to the points in which the English were superior to the Scotch cattle. I came to the conclusion that I had been beaten, not because our Scottish breed was inferior to the English breeds; I saw that I was beaten because I was imperfectly acquainted with the points of the animals most appreciated in Baker street, and the proper system of feeding them. I selected the animals best fitted for exhibition at Baker street, and attained the object of my ambition. The English agriculturists always maintained that a Scot would never take the first place in a competition with a Short-horn, a Hereford, or a Devon; I have given them reasons for changing their opinion. A polled Scot, exhibited by me, took the first place at Birmingham. To a polled Scot, exhibited by me, the Prince Albert Cup was unanimously awarded, at the late Great International Show in France, by a jury of twelve, consisting of English, Irish and French gentlemen, in a competition with the finest oxen of the English and French breeds."

In regard to the size of breeding animals of the Galloway breed, I may mention that at a show of the Highland Society, held a few years since, in the city of Edinburgh, I took the girth of several Galloways, and that a bull two years and four months old measured seven feet and two inches; another, four years and four months old, seven feet and nine inches. These were the first-prize animals in their classes, were well shaped in every respect, and heavy in proportion to their girth. A Galloway bull, bred by Mr. John Snell, of Edmonton, Canada West, weighed, alive, at two years and five months old, 1,830 lbs. Another, bred by the same gentleman, now owned by the Michigan State Agricultural College, weighed, at eighteen months old, 1,480 lbs.

It will be inferred from what has been said, that the leading excellencies of the Galloways consist in their superior value as fattening stock. The cows are not remarkable for the quantity of their milk, but it is very rich, and affords a comparatively large

proportion of butter, of the finest quality. Youatt says a cow may average "six or eight quarts per day during the five summer months, after feeding her calf," and that during the next four months she may give half that quantity, running dry the remaining three months of the year. According to this, we may assume that the average for the first five months would be seven quarts per day, and for the next four months three and a half quarts per day; which would give, as an annual product, 1,470 quarts, besides supporting the calf.

From some experiments made on the milk of cows of different breeds on the "Crown Estate," at King William's Town, Ireland, a summary of which was published in the Journal of the Royal Agricultural Society of England, Vol. IV., it appears that an average of nine and a half quarts of the milk of the the Galloways produced a pound of butter. This would give, as the average annual product from the quantity of milk above mentioned, 154 pounds of butter, an amount which is believed to be far greater than the average product of cows in this country, and exceeded only by well-selected and well-kept herds. But this average product for the Galloways is for the milk they yield *besides supporting the calf*; and to give some idea of the quantity which is used for this purpose, it is proper to refer to accounts which describe the manner of raising calves in Galloway. Youatt says:

"The calves are reared in a manner peculiar to Galloway. From the time they are dropped they are permitted to suck the mother, more or less, as long as she gives milk. During the first four or five months they are allowed, morning and evening, a liberal supply—generally more than half of the milk of the cow. The dairy-maid takes the teats on one side, while the calf draws the milk at the same time, and exclusively, from the other side. When the calf begins to graze a little, the milk is abridged by allowing the calf to suck only a shorter time, and he is turned upon the best grass on the farm. In winter he is uniformly housed during the night, and fed upon hay, with a few turnips and potatoes; for the breeder knows that if he is neglected or stinted in his food during the first fifteen months, he does not obtain his natural size, nor does he feed so well afterwards."

When it is recollected that *half the milk* of the Galloway cow in her native district, for four or five months after calving, is taken for the support of the calf, the quantity she must afford during the year is far from being small, and a fair estimate for the quantity of

butter which all her milk would yield in the year could not be less than 200 pounds—a quantity only equaled by our best dairies with the best management. It should be borne in mind, too, that this product refers to what the stock does in a rough and not fertile country. Upon a fair view of the case, therefore, the conclusion must be adopted that no breed fitted for such a situation would be likely to do better there than the Galloways, even for dairy purposes.

Mr. Snell, of Edmonton, C. W., to whom allusion has before been made as a breeder of Galloways, keeps both this breed and the Short-horns—about thirty head of each. His Galloway and Short-horn cows run together, and he states that the *quantity* of milk given by the two breeds is about equal, but that the milk of the Galloways is much richer.

Considering the characteristics and the long-established reputation of the Galloway cattle, it seems singular that they were not long since introduced into the United States. There can be little doubt of their adaptation to the northern portion of the country. Our Canadian neighbors, many of whom were emigrants from Scotland, evinced a better appreciation of the value of this breed, and some twelve years since introduced specimens into the Upper Province. Their adaptation to the country, and their obvious merits, have caused them to increase and spread rapidly. At the late Provincial Show, at London, C. W., there were no less than seventy entries for Galloways, and ten entries for the polled Angus.

Persons acquainted with the Galloways have been of the opinion that they would be a highly useful stock for portions of our country. The late Felix Renick, Esq., a gentleman distinguished for his judgment in regard to cattle, and who was the agent for the purchase of Short-horns for the Ohio Stock-Importing Company, 1836, more than once stated to the writer of this article, that had his object been to procure the best cattle for the Northern States, he would have taken the Galloways and West Highlanders. I think no good judge, who has had the opportunity of studying these cattle in Scotland, can fail to see their adaptability to our wants.

B. P. Johnson, Esq., the well known Secretary of the New York State Agricultural Society, who has had ample opportunities for examining the stock of Britain, speaking, several years since, of the Galloways in reference to their introduction into New York, says: "There is no doubt of their adaptation to many portions of

this State, as well as to the Northern States generally. Their aptness to fatten is such that they would, at comparatively little expense, be fitted for market, and the superiority of their beef is well understood by every one acquainted with the London market; and if introduced here, they would doubtless become equally popular. I was asked by a distinguished breeder in this State which among the various breeds of cattle in Great Britain I considered best adapted to the Northern States. I answered that, if it was left to me to select, I would have no hesitation in choosing the Galloways and West Highlanders."*

Yet it is only within a short time that any of the pure Galloway breed have been introduced into the United States. Hon. Ezra Cornell, of Ithaca, New York, having seen specimens of the breed at the combined show of the English Royal and Scottish Highland Agricultural Society, at Battersea, near London, in 1862, was so much pleased with them, that he has since imported some. Under date of November 30th, last, he writes: "The Galloways which I saw at Battersea were most beautiful animals, and carried all the points of thrifty, good feeders. I have a bull, two cows, and a heifer calf—all fine animals."

The Michigan State Agricultural College purchased of Mr. Snell, in September last, the young Galloway bull "Victor," to which allusion has before been made, and a fine two-year-old heifer. They are doing well at the College Farm. If, on being subjected to a fair trial, they prove as well as may reasonably be expected, it is to be hoped that the introduction of these specimens will lead to the establishment of the breed in this State.

* Transactions New York State Agricultural Society, for 1846, page 292.

MANAGEMENT OF PASTURES.

BY SANFORD HOWARD.

[From the Report of the Secretary of the Michigan Board of Agriculture.]

The treatment of pastures is an important topic wherever grazing is a leading branch of farming. By what course the land devoted to pasture can be made to support the greatest amount of stock, or yield the best returns in meat or dairy produce, is the point to be settled. The answer, doubtless, depends somewhat on the character of the soil, and somewhat, also, on the climate. It is not proposed to enter here on a discussion of the question of the relative profits of grazing and grain-growing, but simply to consider how land that it is desired to keep in grass shall be managed.

As just intimated, the question is affected more or less by the soil and climate. On some soils grasses may be said to be permanent, while on others the same species have but comparatively a short period of life. A moist and uniform climate is also more favorable to the continued existence of grass than one subject to wide extremes of wetness and dryness, heat and cold. But almost every person of ordinary observation must have seen land on which grass lives or would live for an indefinite length of time. Let it be supposed now that it is desired to obtain from this land the greatest amount of nutriment in the shape of grass, year after year, or for a given number of years, how shall it be managed?

To begin with the land in its natural state, it will be found that such as is most favorable to grass is generally covered with a pretty heavy growth of hard wood-timber, consisting in this country, in a great degree, of the sugar-maple, in some localities intermingled with bass-wood, chestnut, elm, ash, &c. The timber, of course, is to be cleared off; this having been done, the question is, to plow or not to plow the ground? So far as experience has afforded an answer to this question, it seems to be decidedly against plowing for the purpose of seeding the land to grass. In the hilly and mountainous portions of New England, much land has been cleared

which from being very stony could not be plowed without great labor, and even then not well plowed. It was got into grass in some cases by simply sowing the seed on the burnt surface, or in other cases by first harrowing the ground. Some of these lands have been in grass for a hundred and fifty to two hundred years, or more—some as pasture, and some as “natural mowing.” The best hill-pastures of the section referred to are on this land which has never been plowed. Probably the first settlers took what they deemed to be the easiest, and for the time being the cheapest way of getting the land set to grass, because they had not the means of obtaining more labor. At a later day, new land has been more frequently plowed, affording in some instances the means of comparing the productiveness of the plowed and unplowed tracts, for grass, and the results have generally, if not invariably, been in favor of the latter. It is found that the grass does not get so much “bound out,” on the unplowed land. The vegetable matter, which during the forest growth is accumulated on the surface of the earth, seems to aid the growth of grass, and where it is not destroyed by a too severe *burn*, the sward keeps up its vitality better than where the natural position of the soil is reversed.

If, then, it is conceded that in seeding new land to grass plowing is not advisable, the question arises, does it ever become necessary or expedient? The question, of course, is based on the supposition that the grass does not die, or at least that its vitality can be maintained without breaking up the sward. Reference has already been made to examples which this country presents of the durability of grasses—examples which embrace as long a period of time as the settlement of the country admits. In European countries there are lands which have been in grass for a time beyond which neither history nor tradition runneth. The sheep pastures of Wales and Scotland are known to have been grazed a thousand years, in many instances without the application of any fertilizing matter except that dropped by the animals while grazing, and yet it is known that the land carries as much stock as it ever did. Some of the “old pastures” of England are so old that their age cannot be determined. So well established is the fact deemed to be that plowing would be injurious to them, that leases of farms often prohibit the tenant from breaking up particular tracts. No farmer of judgment who has ever examined these rich old pastures would think of plowing them so long as the greatest value in grass is the object. The soil is perfectly covered with those species of

herbage which are most tenacious of life, and at the same time most nutritious. It is the unanimous testimony in regard to these pastures, that they carry more stock, and will produce more beef or mutton, and more butter and cheese, than the same land would newly seeded, and in regard to dairy produce, the *quality* of that from old pasture is much superior. There is no question that experience in this country, as far as it goes, agrees with these facts. It is not intended to say that there is not grass-land in England which might advantageously be plowed—undoubtedly there is such,—but there is also some which it would be unwise to break up, and the same may be said in regard to this country.

This subject was brought before the public by a discussion at a meeting of the New York State Agricultural Society, at Utica, last fall, on the question, "Ought pastures for the dairy to be kept permanently in grass, or to be renewed by plowing and re-seeding?" The discussion was opened by X. A. Willard, of Little Falls, a gentleman who is well known to have devoted much attention to this and other matters connected with the management of dairies and dairy stock. He stated the points to be determined, as follows:

"What kind of pastures are best for the dairy? Are they those which have been in long grass, or are they those which have been recently plowed and re-seeded? Can pastures be kept productive when remaining long in grass, or, in beginning to fail, is it necessary to renew them by plowing and re-seeding? And, finally, what are the cheapest as well as the best modes of obtaining quality and productiveness of pasturage?"

Mr. Willard observed that, "we are not to consider the treatment of all pasture-lands alike, but of those that are particularly well adapted to grass. * * * What are we to do with pasture-lands that begin to fail? Shall we plow them up and re-seed, or shall we adopt some other mode of renovation? I know of pastures that have been in grass for sixty years and upwards, and to-day show no signs of failure. Wherever I have been through the dairy region I find these pastures, and it is the universal testimony of those who have them, that they are yielding better returns in milk than any recently re-seeded grounds. I have seen old pastures plowed and re-seeded and put in meadow, when the annual crop for a few years was large, but when put back again in pasture gave poor returns, and took years in obtaining a nice thick sod. It may be said that the fault lay in

re-seeding—that a greater variety of seed should have been sown, as timothy, the clovers, orchard-grass, blue-grass, red-top, &c. Our farmers, generally, seed mostly with timothy, clover and red-top, using the ground at first for meadow, and afterwards for pasture. What we want—and it is that which usually obtains in old pastures—is a variety of grasses springing up in succession, and those that will bear cropping, so that pastures will afford a good fresh bite from May to November. Old pastures are generally filled with a variety of plants that are adapted to the soil, and in taking off grain-crops, and then re-seeding, the conditions or elements of fertility are somewhat changed, so that anticipated results are not always obtained. In 1855 I plowed up an old meadow, about two acres of which was yielding large crops of timothy and clover, but so situated in the field that the hay crop could not be got off in time. I took from these two acres the first year 180 bushels of corn, and the second year 100 bushels of barley, when the land was seeded down with timothy and clover. For two or three years it did not produce satisfactorily, though receiving the usual dressing of plaster, and I top-dressed it with stable manure, perhaps twenty loads to the acre, but without getting the large crops of grass that I did before re-seeding. Some mineral element, therefore, I supposed to be wanting, perhaps potash and soda, so I top-dressed with ashes and salt, and had no further trouble. I have seen quite a number of old pastures that were yielding tolerably well, plowed with similar results. The land would bear abundant crops of grain, but grass failed to be enduring, or was less nutritious, and hence frequent plowings and re-seedings were resorted to. I visited Mr. Butler's farm near New Hartford, last year. He buys cattle and fattens them for the market, and he told me he had never been able to fatten stock with that facility from grass raised on newly seeded grounds as on those put down many years ago, or from pastures that had never been broken up at all. Many others make similar statements.

“I shall not dispute the point that we may doctor up our lands to produce any desired crop, but to do so may be expensive, and will often require more science and skill than are common to the country. When nature furnishes the condition for producing grasses that give the best result in milk, and when these grasses become firmly established in the soil, are we not pursuing a suicidal policy in destroying them by over-cropping, or by allowing weeds to smother and crowd them from the soil, under the impres-

sion that our pastures can at any time be renewed by plowing and re-seeding? Would it not be better and cheaper to exterminate weeds, and give our pastures some rest during the hot dry weather of July and August, by feeding sowed corn, instead of cropping down to the roots, and allowing the sun to roast them out and destroy the plants? It is the weeds and over-cropping and unprotected covering of pasture lands in hot weather, that are the fruitful sources of failure of grass in pasture.

"Now it is very unprofitable for the dairyman to break up lands that are yielding, or that can be made to yield readily, good crops of grass. Grain-raising with many is considered a matter of necessity rather than choice, but grass fails and the lands are plowed and re-seeded. This may be well enough for meadows, but is not so conveniently managed in pastures. If a part of your pasture land begins to fail, and it is designed to plow and re-seed, the land must be fenced, which is expensive and often very inconvenient. But, after getting it down to grass, cattle cannot be turned in until the plants become somewhat established, as they tread up the ground, pull out the grass by the roots, and by mid-summer you have a barren field. Again, to plow pasture-lands the herd must be reduced to meet the necessities of the case. This is also an objectionable feature, and one that is distasteful to the dairyman.

"When grass *utterly fails*, plowing and re-seeding doubtless should be resorted to; but generally pasture lands may be kept permanently in grass by giving them a little extra care and attention. If they begin to fail from over-cropping or neglect, a judicious course of top-dressing and sowing seed will generally be found preferable to the plow. Usually on the black slate lands of Herkimer, plaster at the rate of 100 to 200 pounds to the acre, every alternate year, will keep pasture lands in good condition. I have found great benefit from the use of ashes, in connection with plaster, at the rate of two or three barrels per acre. Well decomposed horse-manure, hauled out in the fall, and broken up fine, and applied when cows are in the after-feed, has produced good results.

"My old pasture contains about 45 acres, and carries one year with another 30 head of cattle and a span of horses. I have no doubt that all pasture lands in the dairy region would be greatly benefitted by the application of bones, as this material is largely taken from the soil. Ashes are valuable in eradicating mosses, and in furnishing food for grasses, and are worth at least 25 cents

a bushel for most of our grass lands. Lime is of great service to some soils. Six years ago I limed an old sidehill meadow, mossed over and not producing. It was applied at the rate of 40 bushels per acre, and the annual crop of grass ever since has been good.

"I am inclined to think that good old pastures produce a better quality of milk than those recently re-seeded, and that it would be better to renovate by top-dressing than to plow and re-seed. The trouble with recently re-seeded pastures is, the grass early in the season is apt to be rank, watery and more flashy than the thick, fine herbage of old pastures. Considerable portions of it often get the start, and soon become woody, and are rejected by stock. A recently re-seeded pasture will not bear cropping like one that is old. The larger species of grasses are so rank as to crowd out the smaller and finer grasses, which are the most valuable for the production of milk. The feed in old pastures springs up earlier and lasts longer than on grounds recently re-seeded. White clover and June or blue grass are valuable for producing milk; they are indigenous to our dairy soils, and are generally abundant in old pastures, where they seem to thrive best.

"The character of the food which a cow eats has a greater influence on the quality of milk she yields than many imagine. During the drought last season, when the cows began to eat the tufts and portions of pastures that had been rejected or left to grow up high and rank, the quality of the milk was so depreciated that it took from 12 to 13 pounds of milk (the usual quantity being from 9 to 10 pounds), and in some instances more, to make one of cheese. You may, perhaps, get more bulk of grass by plowing and re-seeding, and yet obtain poorer results in milk, than from the old thick sward that has been broken up. One great source of failure and decline of grass in old pastures is over-stocking. The lands are crowded to their utmost capacity year after year, and receiving scarcely any attention, must, of course, succumb at last. Again, weeds are allowed to go to seed and get possession of the soil, and where they thus overrun the grounds and destroy the grasses, doubtless the best course to be adopted is to plow and re-seed; but the true course is to pay attention to pasture-lands in season, giving them an occasional top-dressing, scarifying the surface in spring, and sowing seed here and there upon patches that are beginning to fail. As a top-dressing, sawdust in which the liquid manures have been absorbed, applied in fall or spring, gives great vigor and growth to grasses. It can be spread over the surface in

a finely divided state, and is in condition to be available to plants. Road-scrappings and composts of muck, earth and manures, applied in the fall and pulverized over the surface with a brush harrow, together with the use of ashes, and plaster and lime, all of which are available to farmers, will be found of service in keeping up a permanent pasture. And it is believed by taking a few acres annually and treating them with manures, better results will be obtained at less cost than in plowing and re-seeding. I may remark that in the use of barnyard manures, fresh cow dung ought not to be used on pastures for the dairy, as it produces grass distasteful to dairy stock, and some claim it to be the cause of abortions."

Hon. John Stanton Gould, of Hudson, followed Mr. Willard, and said he heartily endorsed Mr. W.'s positions. "There had been great loss to farmers by plowing and re-seeding pasture-lands. An inspection of newly seeded grounds showed many unoccupied spaces, where the grasses did not grow. After a pasture has lain in grass several years, grasses natural to the soil begin to come in. There are some kinds of grasses that might be advantageously introduced by sowing the seed broad-cast over the ground, and then top-dressing with manure. He referred to species of grasses, which he considered valuable and well adapted for grazing, as the meadow-foxtail, which is the earliest that grows, and gives a good bite ten or fifteen days earlier than any other. If we can have our pastures so as to turn out cattle ten days earlier than usual, a great point is gained. Next in order was orchard-grass. It comes earlier than the blue-grass. It springs up rapidly when fed off, and if it could be generally introduced, would prove of great value for pasturage. The only objection, that it grows in the form of tussocks, can be obviated by going over the ground with a fine-tooth harrow, and followed by a roller. The advantage of an old pasture is that you get a variety of grasses that completely fill up all the intervening spaces, but when only two or three varieties are grown, spaces will occur. However thickly you seed with one kind of grass, spaces will be left, where another kind will grow; so that by having a great variety, all the ground is occupied, and the different kinds thrive well together; but you cannot get this condition of things, except in permanent pastures or meadows. If pastures begin to fail, top-dress them with rotten manure, and leave them for one year in meadow. Seed, also, should be sown, and harrowed in, if required. Bone dust on some lands had pro-

duced great results, and experiments should be made on a few acres and their effects noted."

Rev. Mr. Loomis, of Herkimer County, "was acquainted with a pasture that had not been plowed for twenty-eight years, and four acres of it had *never* been plowed. Another had been down eighteen years. Had seen the first named pasture mowed recently, and the quantity taken off was one ton per acre. He had asked the farmer why he did not break up the four acres, and the reply was, 'I have got to be an old man, and my experience tells me that my old pastures are the best.' Knew another farm, a part of which was plowed and stocked down six years ago, and part not. The latter was producing the best results. It had a firm, thick sod. The grasses in the old pastures were the best for milk. I have no theory to advocate in this matter, but have presented a simple statement of facts. The pasture referred to was put down with barley. The result in that case was that the land was filled with couch-grass and milk-weed. The former disappeared in eight years, and the latter in twelve years, and this is one reason why I would not break up old pastures. We can raise barley on our lands, but straw-fed animals are not the ones that give the most milk. When we go to the wheat region to purchase milch cows, we find it takes about two years to get the straw out of them, or, in other words, to get them in good condition for milk."

Mr. Hoyt, of Madison county, "claimed that the condition of the soil and climate should always be considered. Some pastures do best if left to grass; others require plowing and re-seeding. He thought the Mohawk flats would support more cattle than the Onondaga lands, although the latter might produce more grain. He had owned land on the Mohawk flats, and found it most profitable to keep it in grass and to plow as little as possible. In Madison county it was necessary to plow and re-seed, or pastures would run out."

Other gentlemen who took part in the discussion contended that it was better to plow pastures frequently; but generally, if not in every case, those who took this view occupied a different kind of land from that to which Mr. Willard's remarks applied—land better adapted, perhaps, to grain crops, but not so natural to grass. In some correspondence with Mr. Willard, since this discussion was held, he has given me some further facts in support of his positions. In a letter dated November 7th, he writes: "I feel satisfied, not only from my own experience, but from extensive

observations in the dairy districts, that the ground taken by me in the discussion is the true one. I went last week over the old meadows in Orange county, N. Y., which have not been plowed for a hundred years. They produce, without top-dressing, about a ton and a half of hay to the acre, and it is held as worth 25 per cent. more in nutritive value than that grown on recently seeded grounds. Mr. Lewis, of this county, has an old meadow, which, by top-dressing, produces enough hay for the winter keep of fifty cows. The Orange county people say they get better flavored butter from old pastures, and I know that the best results in cheese in this region are obtained from such pastures."

In an article by Mr. Willard, in the Utica Herald, he has spoken more particularly in reference to his observations in Orange county, and respecting the grasses which are found in the old pastures he says :

"In the old pastures there are several species of grasses that spring up spontaneously, and afford sweet and nutritious feed, and from which the best qualities of milk and butter are produced. These grasses form a rich, thick turf, leaving no intervening spaces. The grasses are similar to those found in the old pastures of Herkimer, Lewis and Oneida. They embrace the June or blue-grass, *Poa pratensis*; the fowl-meadow grass, *Poa serotina*; meadow fescue, *Festuca pratensis*; red-top, *Agrotis vulgaris*, and the wire-grass, *Poa compressa*. Timothy, orchard-grass, red clover and other forage plants, are also grown in pastures and meadows. The June-grass is regarded as very valuable, throwing out a dense mass of leaves, highly relished by cattle, and from which a superior quality of butter is made. It is found growing throughout the butter districts of the county. The wire-grass is deemed one of the most nutritious of grasses, is very hardy, eagerly sought after by cattle, and is one of the best grasses for fattening. Cows feeding upon it yield milk of the richest quality, and from which the nicest butter is made. It flourishes well upon gravelly knolls and in shaded places, and its stem is green after the seed has ripened. It is found growing in all parts of the county. The meadow-fescue is common in the old grass lands where the sod is thick and grasses of different species are mingled together. It starts early in spring, is relished by stock, and furnishes good early feed. The milk-farmers hold it in high estimation as a grass tenacious of life, and not running out like timothy or clover."

The grasses above spoken of as "natural," are not considered

by botanists as indigenous to this country ; they were undoubtedly introduced from Europe, either by design or accident, but having obtained a stand here, "come in" naturally, or without the seed being purposely sown, in many cases. The June-grass, so called in some localities, is the famous blue-grass of Kentucky—*Poa pratensis*. It is extensively disseminated, and in the best pastures of this country as well as those of the British Islands, forms a large portion of the herbage. Its congener, the *Poa compressa*, sometimes called flat-stemmed blue-grass, frequently wire-grass, is not so common, though it will grow better on dry soils than the *P. pratensis*. It is even superior in nutritive properties to the latter, and is generally placed at the head of all grasses in this respect. The opinion of the Orange county dairymen, that it is one of the best grasses for fattening and for producing the finest-flavored butter, is supported by the testimony of every one acquainted with the species. The meadow-fescue is also a valuable pasture grass. It is not as widely disseminated in this country as the blue-grass and wire-grass, but is quite common in the older settled districts of New York and New England.

As before remarked, the permanence of the sward in pastures depends much on the species of grass introduced, and hence it is important to obtain the best—such as are both hardy and nutritious. It is not always easy to obtain seed of the desired species. Fortunately, the blue-grass—which, in reference to all its properties, is the most valuable—comes in almost universally on good grass lands. The white clover is nearly as common, and though too much of it in a sward renders the feed more succulent than is desired, a mixture of it with blue-grass, or with wire-grass, makes excellent pasture for all kinds of stock. The grasses which are generally sown for meadows, or for hay, as timothy and red-top, are not the best for pastures. Timothy is not a very lasting grass, and either for meadows or pastures will not retain its vigor many years. Red-top is more enduring, but is not very nutritious. There are at least two well-defined varieties of what generally passes under the name of red-top, or the species *Agrotis vulgaris*. That commonly seen in this State is the large red-top, so-called, in contradistinction to the small red-top, or "fine-top" of some sections. The former favors rather damp soils, where the stalks grow to the height of eighteen inches or more. The latter grows better on dry soils, and is in fact considered, in some of the Eastern States, as one of the best grasses for rather dry, loose soils. The

stalks are small, twelve to fourteen inches in height, and more solid than those of the larger kind, and the grass for either grazing or hay, is considered more nutritious.

Considering the subject of pastures, in reference to all soils, it appears :

First, That on some soils, grasses will live but so short a time, that it is not an object to endeavor to continue them for permanent pastures. Such land, if suited to grain or other cultivated crops, may be brought under a system of rotation ; if not, devoted to forest trees.

Second, That some soils may be kept permanently in grass by occasional scarifyings or harrowings, with top-dressings of suitable manures, and re-seeding, on the surface, spots where the sward becomes weakened.

Third, That some soils which are particularly natural to grass, if once set with the proper species, may be kept in pasture for an indefinite length of time, in many cases without manifest deterioration, though fertilizers,—as bones, ashes, plaster, &c.,—may be advantageously applied at intervals.

PASTURE LANDS.

BY JOHN JOHNSON, JR.

[From the Report of the Secretary of the Massachusetts Board of Agriculture.]

The management of pastures presents a subject of peculiar interest to every farmer. Grazing forms the most profitable and important department, but hitherto the most neglected of any on the farm.

Urgent inquiries are constantly heard from every part of the State in regard to pasture management, with the universally acknowledged fact that they are becoming, in a sad degree, exhausted and unproductive.

Our first endeavor should be to discover the causes upon which this deterioration depends; and having ascertained some of the more important of these, we can the more readily decide upon the most judicious course to pursue to insure a restoration of our pasturage to former productiveness.

One great cause of this impoverished condition is attributable to improper cropping and overstocking; thus constantly carrying away those elements from the soil necessary to the formation of bone, flesh and milk, while no adequate equivalent has been returned.

While the sunshine, air and rain constantly contribute largely toward securing a plentiful harvest, without the aid of an abundant supply of materials, similar to those which have been taken up from the soil, through vegetation in large measure, into the products of flesh and milk, these must be comparatively ineffectual.

No soil can long withstand close and continual cropping. Evidently by this process it is overstrained, and, at length, must become exhausted in those essentials which serve directly as nourishment for the growth and maintenance of the innumerable roots, leaves and seeds of the various grasses.

The soil has thus generously parted with its salts in the production of vegetation, to supply the demands of grazing millions,

dependent upon it for life and sustenance. In affording this incalculable supply, its stores in sulphates, nitrates and phosphates, have been largely exhausted ; and in order to reanimate its now slumbering energies, and renew its fertility, these must be restored.

We know that potash, soda, magnesia, lime, phosphoric and sulphuric acids, enter largely into the composition of grass. These, then, should in needed measure be combined to form some of the essential restoratives which we must endeavor to supply to the soil when this important crop deteriorates.

In the use of certain proportions of unleached ashes, common salt, bone-dust and plaster, this object may be in a great degree attained. I would not say that it is, in any case, absolutely necessary to supply all the constituent principles of grass to the soil at *one and the same time* ; for we know that the earth is a great store-house and laboratory, in which important chemical changes are constantly taking place, producing the various combinations which enter into vegetable life ; and that she is furnished more abundantly with some of these essentials than with others ; and hence her need of an artificial supply of some one or more of these will soon occur. But I would say, that in so far as she becomes exhausted or weakened, in any considerable measure, in any of these materials, they must be promptly and efficiently restored by the hand of art and science.

When we remember that every blade of grass that grows takes up a certain portion of these substances from the soil, and consider the innumerable millions that have been nourished through more than a century, and are now growing, it becomes obvious, and needs no argument to show, that, if she is not proportionately compensated, vegetation must necessarily famish, and man and beast, so far as they depend upon this production, suffer immeasurably. We should not forget that nature is never false to us, nor stingy in her products ; but with the necessary supply of food for her operations, she will abundantly satisfy every reasonable demand.

Another fruitful cause of this deterioration is found in allowing brush-wood and brambles, foul grasses, and various noxious herbs and weeds to mature and scatter their seed over the land, which, taking root, have finally become the prevailing growths of the field. These must be entirely exterminated, root and branch, as they overpower and destroy all the finer, more delicate and desira-

ble products, as we know they have already, on the face of many a once fair pasture.

For convenience, in speaking more particularly of the treatment of pasture lands, I will divide the subject into three classes, viz : high hills, easy rolling, and lowlands. What might be considered good husbandry for the one, could not be practised on the other. Many of our high hill pastures abound, more or less, in those foul and sour growths to which we have alluded.

Our first effort towards the improvement of all embraced in this class found worthy of being continued for grazing, is to get rid of those detestable and poisonous over-growths. How this shall be accomplished depends entirely upon location, the surface, character and nature of the soil. Many of these hills are very stony, and of such rugged and steep inclination that it is impossible to subdue them by the plow ; therefore, we must adopt some other method. The first course suggested to my mind is that of stocking with sheep. Personally, I have had but little experience in sheep-husbandry. I will, however, state one fact which occurred on my farm.

A few sheep were purchased in mid-winter, and in the spring turned out with the usual increase in lambs upon a small lot which had a large growth of briers on different parts, cut in the autumn previous, and a large, unfruitful grape-vine trailing on the ground. In a single season the sheep destroyed every vestige both of the briers and vine.

I have made some inquiries of those who have turned their attention to sheep-husbandry, and the testimony is that they exterminate all bushy growths more effectually than any other means employed.

In my boyhood, sheep were kept on farms to some extent in Framingham ; and for many years after the sheep were abandoned and cattle substituted, not a bush or wild plant was seen, but only a beautiful and luxuriant growth of grass adorned those pasture grounds, so effectually subdued and enriched by sheep alone. Those pastures, from neglect, are now sadly changed in appearance and productiveness. Instead of fine, nutritious grasses, once their pride, they now present an over-growth of wild grass, bushes and moss.

I do not propose to discuss the question whether sheep may be profitable for our farmers to keep for mutton and wool, either in

this or any part of the State, but as a means of reclaiming such pastures as cannot be subdued by that great subduer, the Plow.

From long experience it is evident that mowing bushes will not eradicate them. That we may obtain the necessary feed for our stock in summer, and that our pastures may not become a wild, the bushes and other improper growths must be cut as often, at least, as once in two years, which, at the present high price of labor, will cost from four to six dollars per acre; or from two to three, if mowed every year. If we *only* mow, we must *re-mow* during our lives, and our land becomes no richer by the use of the scythe; therefore we shall leave a worthless inheritance to our children, and the more of the like we leave, the poorer will they be, if our example and footsteps are followed by them.

If we conclude to lay the scythe aside, but are still determined to *subdue*, while we *cannot plow*, our resort must be to the Hoe. When this instrument is used, the roots must be cut about two inches below the surface of the ground. This will effectually destroy the shrubs. Having cut the bushes and other similar pests in this manner, and burned them, select a day just previous to a gentle rain, if convenient, applying some of the fertilizing agents mentioned, and re-seed, using a harrow for the purpose, if possible. This method for small patches, at least, will be found a profitable means of subduing and improving some lands.

Many of our pastures might be much improved by receiving a new supply of grass seeds of the best varieties; and this, in many instances, will be absolutely necessary to obtain, by the application of fertilizing combinations, a satisfactory result.

The use of the hoe for large tracts of lands would be rather expensive, but far better and cheaper in the *end* than the everlasting and inefficient operation of the scythe.

But will not sheep be a far better and still cheaper means than either of those instruments for the farmer to employ? At the present time sheep may be purchased for from two to five dollars each; and this quality will be as effectual for mere purposes of subduing pernicious growths as those costing much more.

From five to seven sheep may be pastured on the same amount of ground required to keep one cow; she will never destroy the growing bushes nor prevent others from springing up. But turn out the five or seven sheep instead, and within five years, our bushy pastures, nearly worthless now, might become flourishing and valuable as in former times.

Sheep thus employed as substitutes for the scythe and hoe, which latter scatter no fertilizing products behind, are vastly more ready subduers, and, at the same time, leave a large amount of manure of superior excellence. Even the very plants and shrubs we seek to destroy by this means are converted largely into this valuable substance for the growth of the grass we need. Thus our pastures, many of them, may be made luxuriantly green and velvety as those lawns surrounding your dwelling-places.

May not this desirable object be accomplished by much less expense in the use of sheep than in any other manner, considering they will produce a few pounds of wool yearly, and a lamb or two each, the profits of which will nearly equal the product of a poorly kept cow, and this at no cost for mowing or manuring the land?

Irrigation is another method which may be adopted for the improvement of some pastures of this class, or any other favorably located, and needing moisture at certain seasons. This may be attained by the construction of a suitable reservoir at the most convenient point, with a conduit laid to discharge the water, accumulating within from rains from time to time, into a furrow leading along into other furrows running in somewhat parallel directions around the hillside. These furrows may be furnished with small outlets here and there, in a manner to distribute the water evenly as possible over the entire surface, thus securing an invigorating source of moisture to the soil in dry seasons, and those elements of fertility held in watery solution. The whole expense need be but trifling—only that necessary for the preparation of the excavation, the erection of a slight roof to conduct the water into it, and for laying the conduit and furrows.

Our moderately hilly or rolling pasture lands are usually our best and most fertile grazing grounds. These, except in rare instances, should never be broken by the plow, breaking up impairing their value.

This class are generally quite free from bushes and other foul growths prejudicial to fertility, and no particular complaint may be offered in regard to them, except they are in an unproductive state, some of the causes of which have been already hinted.

Should there be found on the surface of any of this class patches of bushes, wild grasses and brambles, more or less numerous, these should receive the same treatment previously recommended for such cases whenever they occur.

Here I would remark in general, that, for some of our cold, wet pastures, sloping northerly and westerly, upon which the influence of the sun is but imperfectly felt, some form of drainage might be beneficial; and it has been stated by some careful observers that the effects of *gypsum* are more decided on slopes of this character and inclination.

Shade trees are desirable on all pasture lands, both as an embellishment to the grounds and comfort to herds and flocks. These should be allowed to stand, or planted when none are growing, on the highest or least productive portions.

Some pastures included in this class might be benefited by harrowing the surface in early spring time, and scattering some seed anew, with the application of some fertilizing materials in form of dust or compost before indicated. But generally this class require only a fresh supply of seed scattered over them on the snows of spring, with an occasional dressing with appropriate compounds, together with rest once in awhile for a season. This course, with fair and judicious stocking, will insure an ample reward for our labor and outlay. Nor would just the amount of increase in grass thereby furnished for our animals, the profits of which we should receive in flesh and milk, be all the extra gain derived from this changed condition; but our stock would become permanently improved and their value enhanced, while, at the same time, their manurial products scattered over these acres, or accumulated for use on other lands of the farm, would be proportionally increased in quantity and quality; for the richer the food consumed the more highly nourishing to plants are all the excrements derived therefrom.

Judging by their management, many seem to think that manure is all the same from whatever kind of food derived, all the difference being that which distinguishes its animal sources, as from horses, neat stock, sheep, swine, &c., whether from healthful, fleshy, comfortable creatures, well cared for and fed, or from poor, miserable, half famished, neglected specimens. But this is a mistake.

If our pastures are enriched by affording the requisite elements for an abundance of highly nutritive grass required for the finest and highest development of our animals, a large proportion of the excellence contained in the food supplied will be found in the manure, and this must necessarily be of much greater value than that can be from animals grazing upon neglected pastures affording

but a limited amount of that richness of nourishment conducive to vigor and strength. How important, then, in every point of view, that we turn our attention immediately to the renovation of our grazing lands, and adopt some new and more successful methods of improvement, those hitherto practised having nearly exhausted and ruined all; and especially when we reflect that without flourishing, fertile pasturage, our herds and flocks, of whatever blood, must inevitably languish and cease to yield a profit, while our farms, in other departments, must also deteriorate.

Lowlands may require a different treatment from either of the classes mentioned, but all have many demands in common. Those in this class overgrown with moss, coarse grass, ferns and rushes, in root and in surface-soil most difficult of decomposition by the usual methods, and having a cold, insoluble base of clay, should be treated by a course of deep drainage, paring and burning, thoroughly harrowing, lightly manuring, spreading evenly the ashes over the surface, and seeding with those varieties of grass most desirable. This course may be adopted with the assurance of great success.

Plowing and thorough cultivation, seeding in the usual manner, may be attended by similar good results; still I incline to the adoption of drainage, paring and burning as offering the best and most certain mode of subjugation of this variety, and the entire destruction of the seeds and roots of every mischievous growth by which it has been infested.

On smooth lowlands, producing already the desirable varieties of grass, some finely-prepared barnyard manure spread evenly over the ground, or the occasional sowing of some fertilizing agents recommended, will insure abundant and satisfactory crops. To practise a system of the rotation of crops on some of these lands might be, perhaps, attended by greater profits than stocking all of them permanently to pasture. It must be borne in mind however, that in pursuing this system, rest, at least, during one year in five, is considered important, and that more labor is required, and a greater outlay in manure. But we must be guided in our management by the surrounding circumstances.

In all cases appertaining to seeding lands for pasturage, we should determine, as far as possible, for what use they are more particularly desired,—for fattening or for dairy purposes; because experience and observation have taught that the same pastures or variety of grass do not produce meat and milk with equal facility.

The practice adopted by many farmers of mowing lands for the hay-crop, during two or three years immediately subsequent to stocking with grass, but intended ultimately for pasturing, is, in my judgment, highly prejudicial, and should be abandoned, devoting them from the first strictly for grazing.

Our newly-seeded grounds for pasturage should be cautiously fed, always endeavoring to leave some grass for seed, and a sufficient growth near the surface for the protection of the roots during seasons of drought, and from the destructive frosts of winter. Indeed, who does not know that a pasture, stripped of all its vegetation, and fed, as is often the case, so closely as to loosen many of the grass roots, will the next season produce but a small allowance of feed; but that, with prudent cropping, will yield an abundance of luxuriant food.

With wise and careful management in this respect, and with a sufficient quantity and a good quality of gypsum sown per acre, occasionally, as required, or its equivalent in weight of some other sustaining and invigorating agent of fertility, will preserve the productiveness of our naturally good pasture-lands to the end of time; and, certainly, for those having less of the original elements of vitality and energy, this peculiar caution and care is all the more essential.

In 1849, I purchased a small farm, divided, as usual, into pasturing and tillage. One pasture, containing five acres, sloping gradually north-easterly, with a gravelly soil abounding in small stones, was inclosed by a stone-wall and situated on the highest point of the farm. It was completely overrun by small bushes, blackberry vines, sweet fern and other foul growths, and generally known as "*Checkerberry hill*," checkerberries being its chief products.

In June, 1850, I plowed it, employing four oxen and three men, completing the work in about twelve days. In September following, with the same team and labor of two men, it was thoroughly harrowed by the use of the large harrow required for seeding land from which a recent growth of wood has been taken. In this condition it remained until the next spring, when I plowed it again with one yoke of oxen to a plow, harrowing with a common harrow, and planted with potatoes, using nothing but good plaster in the hills, the rows being nearly four feet apart. The potatoes received one thorough hoeing with the breaking-up hoe, no plow being used. For the crop harvested I received more than two hundred dollars, retaining a quantity for home use.

The land was then plowed and thus remained until spring, when again it was first harrowed and then plowed once for the season, but no crop was taken from it. The spring after, it was plowed and harrowed, the stones gathered to some extent into large heaps on the ground, and seeded to oats with the usual varieties of grass-seed, and a sprinkling of white clover. The oat crop was a complete failure; so much so, that I did not spend time to harvest all of it from the field. In the autumn I finished gathering the stones, which in all were estimated at five hundred ox-cart loads.

In the autumn the field presented a large and flourishing growth of grass, which was not fed, but suffered to remain on the root.

In the following spring it showed a thick and promising growth of red and white clover; and in June I turned my milch cows upon it to graze, but avoided close feeding, which practice was continued.

This pasture remained very productive in grass until four years ago, when, finding myself with a largely increased stock of milch cows, I departed from the *rule*, and suffered *close* feeding for two years in succession. Observing that my pasture was faltering, I immediately adopted, in a measure, the system of rest, by which I hoped, in some degree, to restore it to former productiveness.

I am fully of the opinion, that, for the space of four years, I have not received one dollar for the extra stock kept during the two years of close cropping mentioned, to say nothing of the reduced condition of the pasture.

I am confident that highly fed milch cows yield a large income, and are a source of profit; whereas, from those poorly kept a *small* income and no profit is received.

ESSAY ON BREAD AND BREAD MAKING.

BY JAMES R. NICHOLS, M. D.

[From the Transactions of the Essex County (Mass.) Agricultural Society.]

The remarks made by a committee on bread, at the society's exhibition in 1863, are eminently proper and just. They remark, "that they can see no benefit to be derived from an exhibition of bread, unless those who are so unfortunate as to be lacking in skill, 'can go and do likewise.' They can look at the beautiful loaves on exhibition, and, with a sigh, express the wish to know how to make such bread; but the information has not been given by the exhibitors. We suggest that, hereafter, all entries of bread shall be accompanied by a statement, describing the process of mixing, kneading, baking," &c.

A premium having been awarded to bread made in my family, at the last exhibition of the society, I am induced by the expressed wishes of many, to make a statement in relation to the methods of its production and also to present some general observations upon bread, and the science of bread making.

As regards the show of bread at the exhibition, it was indeed not of a character such as we could wish it to be. The number of loaves upon the tables was unusually large, and among them were many specimens of a quite imperfect character, being heavy, doughy, and some had passed into the acetic fermentation stage and become sour.

It is presumed that in preparing bread for exhibition and premium, the makers do their best in its production, and that a display of the kind may fairly represent the best skill in this department of household labor.

Regarded in this light, the conclusion is reached that very many families have hardly yet learned what good bread is, and that there is a wide margin for improvements in the methods of bread making. No subject is certainly more important, as it has direct bearing upon the health and consequent happiness of households, and it should receive the attention which it deserves.

Besides the manipulating processes, the manufacture of good bread involves some other considerations of no secondary importance. It is useless to attempt its production with imperfect or bad materials. The flour or meal must be sweet and from fully matured grain. During the past two years the market has been crowded with flour of a damaged character. The severe rains and long-continued moist weather at the South and West, were unfavorable for securing the grain crops, and much of it germinated in the fields and barns and was thereby rendered unfit for bread making. In the germinating process, diastase is formed; this reacting upon the starch of the flour in the baking, transforms it into dextrine and sugar, and prevents the formation of light, spongy bread. Flour from such grain will afford only sticky, glutinous, heavy bread, no matter how much care and skill are bestowed in the making. Fungous growths also appear in wheat injured by moisture, and the flour becomes "musty." In bread from such materials, beside its repulsive physical appearance and unpleasant taste, a chemical change has occurred which renders it positively injurious as an article of diet. The nutritive properties, the gluten, especially, has undergone decomposition and new bodies have been formed, which are not of an alimentary nature. Impaired digestion, derangements of the bowels follow the use of bread from such flour. The poor, who are unable to pay large prices for choice, selected brands, suffer greatly from this source, and much of the bread they are compelled to eat is well calculated to weaken rather than sustain the vital functions.

During the most favorable seasons thousands of bushels of wheat are made into flour, which, owing to local causes, delay in harvesting, or storage in large bodies, is rendered entirely unfit to be used as food. A portion of this is employed in the arts, but the great bulk goes into families, and feeble children, as well as adults, are forced to consume it, much to their injury. It is doubtful if anything can be done to abate this evil; the cupidity of men is but little affected by considerations of right, and the thirst for gain is potent and irresistible.

There are several methods of testing wheat flour, which are available to purchasers, although none of them afford positive indications. Good flour is not sensibly *sweet* to the taste, but bad flour often is. This is owing to the presence of glucose, resulting from chemical changes in the grain, by partial malting. Extreme whiteness is a good indication, as changed grain is discolored in the

process of change. Good flour is tenacious and unctuous to the touch ; when thrown against a wall it should adhere and not fall rapidly. It does not feel *crispy*, and when formed into a ball in the hand, adheres together like a ball of snow. To the sense of smell it is sweet and pleasant, and when taken into the mouth, forms a glutinous mass, free from all disagreeable taste.

The nutritive quality of flour depends upon the proportion of gluten which it contains. In the best specimens ten or twelve per cent. is found. A barrel of flour contains about twenty pounds of gluten, and one hundred and fifty of common starch. The starch can easily be washed out of a small quantity of flour by placing it in a bag of cotton cloth and kneading it under a stream of water. The gluten remains upon the cloth and is a gray, viscid, tenacious mass, insoluble in water. It is the strength-giving principle of the flour, and in a three pound loaf of bread there should be at least three ounces of this substance.

Bad bread is by no means always chargeable to imperfect materials. Hundreds of families, who procure and use the most perfect flour, subsist upon bread of a very inferior quality. Some house-keepers assert that they can have no "luck" in bread making ; their loaves are always heavy, or sour, or doughy, or burnt, and they give up experimenting and become discouraged. As with good materials every one can prepare good bread, there should be no want of success.

Success depends in a great measure upon good judgment, faithfulness and patience in working, and in using the right materials. It is quite preposterous to present a fixed recipe and set it up as an infallible guide in this department of household labor. The method adopted in my family, and that by which the specimen exhibited was prepared, is as follows :

Sift five pounds of good flour and put it in an earthen pan suitable for mixing and kneading. Have ready a ferment, or yeast, prepared as follows :

Take two potatoes the size of the fist, boil them, mash and mix with half a pint of boiling water. A fresh yeast cake, of the size common in the market, is dissolved in water, and the two solutions mixed together and put in a warm place to ferment. As soon as it commences to *rise*, or ferment, which requires a longer or shorter time, as the weather is warm or cold, pour it into the flour, and with the addition of a pint each of milk and water, form a dough, and knead for a full half hour. Form the dough at night, and al-

low it to stand until morning, in a moderately warm place; then mould and put in pans, and let it remain until it has become well raised; then place in a hot oven and bake.

The points needing attention in this process are several. First, the flour must be of the best quality; second, the potatoes should be sound and mealy; third, the yeast cake is to be freshly prepared; fourth, the ferment must be in just the right condition; fifth, the kneading should be thorough and effective; sixth, the raising of the dough must be watched, that it does not proceed too far and set up the acetic fermentation and cause the bread to sour; seventh, after the dough is placed in pans it should be allowed to rise, or puff up, before placing in the oven; eighth, the temperature of the oven, and the time consumed in baking, has much to do with the perfection of the process.

If this method is followed by the exercise of good judgment and ordinary skill, white bread of the highest perfection will be uniformly produced.

Unfermented or "cream of tartar" bread is never placed upon the table in my family. There are special dietary or sanitary reasons for its exclusion. All "quick made" bread is usually prepared in haste, and the adjustment of acid and alkali is apt to be imperfect. Not one pound in a hundred of cream of tartar sold in the market is free from adulteration. In ten specimens procured from as many different dealers, in a town of ten thousand inhabitants, I ascertained by analysis that the *least* percentage of adulterating material was twenty-two per cent.; and several were over seventy per cent. The "yeast powders" so common in the market are composed of acids in association with alkaline carbonates, usually bi-carbonate of soda. If tartaric acid, or cream of tartar, is used with the soda, there remains in the bread, after baking, a neutral salt, the tartrate of soda, which is diffused through the loaf and is consumed with it. This salt has aperient properties—in fact is a medicine—and thus at the daily meal, those who use bread made with "powders," or with cream of tartar, are taking food and medicine together.

Some years ago, Professor Horsford, of Cambridge, proposed substituting phosphoric acid for the tartaric, and this excellent idea has been put into practical effect in the production of yeast powders. In the use of this acid, *phosphate* of soda would remain in the loaf, and as this is made up of the element which we lose in

sifting out the bran from the flour, it must prove healthful, or at least unobjectionable. But bread prepared by *effervescing* powders is, at best, a poor substitute for that which results when the dough is raised through the agency of vinous fermentation—regular yeast, in some of its forms, being employed. Effervescents may be used in exigencies, which occasionally occur, but it is hoped that the good housewives in our county do not, in their bread making, habitually depart from the good old way of raising the loaf by panary fermentation.

It was a noticeable fact that no specimens of whole meal, wheaten, or corn bread were offered for exhibition. It is presumed that the premiums of the society were intended to include these forms of the "staff of life," and it is a matter of regret that none were presented. There is manifestly a perversion of sentiment, or fashion, as regards bread made from the unbolted meal of wheat, which ought to be corrected. Why, upon the tables of farmers the white flour loaf should usurp the place of the darker, but sweeter and more healthful one from the whole meal, is a question of no little interest and importance. In Essex County but few soil cultivators raise this noble grain in quantities large enough to meet family wants, and it is probable if the reverse of this were true, the grist would be carried long distances to a mill with a bolt, to separate the fine flour.

If there is any one form of bread more delicious than another, or more conducive to the sustentation of the physical and intellectual powers, it is that from unsifted wheat meal; and every owner of land should include this grain among his crops, that he may have the bread fresh and in its highest perfection. A generous dressing of finely ground bone will put almost any field in condition to grow a profitable crop; and in these days, when Western flour of the better sorts commands such enormous prices, there seems to be no good reason why farmers should not resume the cultivation of wheat in our county.

Corn bread is also excellent and most nutritious. It contains a large amount of oil not found in other grains, which adds greatly to its value. There is far too little of this used in our families. The old-fashioned dish of corn "pudding and milk" is now nearly as obsolete as that of "bean porridge"; and may we not, with much reason, attribute the physical degeneracy of the present race to the radical changes in the forms of food? Regarding the mat-

ter from a chemical and medical point of view, it certainly would be difficult to select better or more healthful forms of human nutriment—forms so well calculated to build up and sustain a “sound mind in a sound body,” as the two named above, once so popular, but now banished from our tables. They were easy of digestion and assimilation, and contained all the chemical substances, or organic and inorganic constituents needed to nourish the body and mind. Certainly, white flour bread, cake and condiments, are poor substitutes for the sensible but plain dishes of our fathers and mothers a half century ago.

ESSAY ON BREAD MAKING.

BY MRS. JOHN R. WOODS.

[From the Transactions of the Illinois Agricultural Society.]

The Holy Scriptures tell us that "bread strengtheneth man's heart," and that "bread is the staff of life," showing that it is something necessary to sustain the body as well as the heart. The word first occurs in the third chapter of Genesis, at the expulsion of Adam from the garden of Eden. It is found in the Scriptures more than one hundred times, in most cases as a common term for all food.

It is impossible now to speak with any degree of certainty of the date when raised bread first came into use. But the fact that Moses, at the institution of the Passover supper, commanded the Jews to abstain from leavened bread, and eat only unleavened, shows that they were accustomed to fermented or *raised* bread.

From ancient history we learn that the Greeks were taught the art of bread making long before the Romans, who took from Macedonia Grecian bakers into Italy. From Rome the art gradually found its way over considerable portions of Europe. Bread has been, from the beginning of man's advent on earth, in every portion of the world, and every period of time, one of the first, most important and most universal articles of food.

The materials for making bread are different in different countries; we will not enumerate them at this time. In our country, wheat, by unanimous consent, is deemed the best article for bread-making, and "it is a remarkable fact that wheat comes nearer to man than perhaps any other plant in its power of becoming adapted to different climates, over a wide extent of earth's surface, so that it may almost be said, that wherever the human species can flourish, there wheat can be cultivated."

All who have had experience in bread making, and have been close observers, know how intimately connected it is with the dearest interests of our families; such will not feel that any rea-

sonable amount of care and labor is *too great* to secure *good bread*, to make which good materials are indispensably requisite.

First, good wheat, thoroughly cleaned and well ground into flour; then good, brisk, sweet yeast. This is made in a variety of ways; some persons preferring one kind, some another, but they generally succeed best with that to which they have been accustomed from early life. Brewers' yeast, though much more rapid than any other, is objected to by some on account of the many impure and poisonous drugs used in the manufacture of beer, and which they think more or less taint the yeast. Milk yeast and salt rising make beautiful bread, but they require a knowledge of their nature and the utmost care and attention in the making and baking of the bread, or the results will be most provoking and unpleasant. Hop and potato yeasts are both excellent, and very popular in this part of our country. The process of making is well known. It would require more space than can properly be devoted to an essay of this character, as well as a scientific pen to exhibit in detail the action of the starch, gluten and saccharine matter (properties of flour) upon each other, in raising the dough. Carbonic acid gas, formed by the action of the yeast on these properties of the flour, is the air which puffs up or swells out the dough, and forms what is called raised bread. When the dough stands too long, the fermentation destroys the sugar, acts on the starch and produces acid. As long as the fermentation is confined to acting upon the saccharine matter, the other properties of the flour are uninjured; further fermentation must be arrested by the heat that bakes it into bread. If the fermentation acts upon the mucilage and starch, the acid must be neutralized by saleratus or soda. By this process we may have bread free from acidity, but in a short time the bread is apt to become dry and tasteless. If the dough becomes acid, the best and most successful way of adding the alkali is at the time of moulding the dough into loaves, just sufficient to correct the acidity. Much care and judgment are required in applying this, or the bread will be clouded with yellowish spots, or assume a sickly appearance all over. The surest way is to dip the fingers into the solution, and thrust them in every part of the dough as it is worked over.

To make good bread, a great deal of pains should be taken, after selecting good flour and sweet yeast, in working up and kneading the dough. It is not enough to stir the ingredients together so as to get through the business as soon as possible; but it must be

thoroughly worked together with the hands, that the yeast may penetrate every particle of flour. The second working, previous to putting into pans, should be attended with still greater care ; it should be kneaded until perfectly smooth and of a flaky appearance. No more flour than is necessary to keep it from adhering to the board and hands should be used, else the bread will be too hard and dry. Soft water is preferable to make dough. Some persons prefer milk, or milk and water, though with some the animal taste produced by milk is objectionable.

The oven should be ready to receive and bake the dough before the second acetous fermentation begins, or the bread will be totally unfit to be eaten. It will be dark, full of holes, sour, hollow in the centre, and tough and heavy.

When taken from the oven, bread should be placed on a dry, clean and unpainted shelf or table, on its edge, one loaf not touching another ; if placed in a closet or pantry, there should be no vegetables or cold victuals near, as it readily contracts any unpleasant smell or flavor. It should not be placed in a milk house or cellar until quite cold, as the damp and coolness, acting upon the heat in the bread, have a tendency to make it mould. If it has a hard crust, caused by too great heat, or by remaining too long in the oven, a clean, wet towel should be wrapped around it.

To know how to make good bread, and when to bake and take out of the oven, require close observation, good judgment and long practice. Receipts may be procured from the best bread makers, rules and theories consulted and studied, and still no *good bread* produced. One ounce of good practical knowledge is worth pounds of theories.

The wife and mother of the family should herself attend particularly to this item in the kitchen department, and if not putting her own hands to the work, must know how to instruct her domestics. The health, happiness and well-being of a family depend more upon the uniform goodness of the bread than upon anything else in the whole domestic economy of the household.

Mothers should see that their daughters early learn how to make good bread, even at the expense of never knowing how to finger the piano or make rich cakes. These can be dispensed with and the temper not soured, nor the good feelings, the harmony and health of the family broken in upon, as in the case of continued use of heavy, sour, ill-baked bread.

In the line of bread making, we have been in a great measure

retrograding these twenty years. We now seldom see the large, white, light loaves that graced the tables of our mothers and grandmothers. *They* were not afflicted with that tormenting and spirit-destroying disease, dyspepsia, neither with neuralgia and all the other tribes of new diseases, that now so unmercifully assail the human family, mostly produced by bad diet, not the *least* of which is *bad bread*.

One cause of the bread of the present day not comparing with that of a quarter of a century ago, is the scarceness of grist mills in our new States. Farmers, though raising good wheat, cannot have it ground in small quantities, thus having it ever new and sweet. They are obliged to exchange it for flour, or to sell it and purchase flour of which they know nothing. Sometimes it is old and long packed. This never makes *good* bread. Bakers use much of this kind, and with the aid of alum, potash, and other injurious ingredients, make light, white bread, but it is destitute of sweetness, and sooner becomes dry and tasteless. Another cause is baking in stoves instead of the fine brick ovens, reflectors or Dutch ovens of other days. Stove heat dries it too much and takes away the fine, natural flavor of the flour. Another cause of failure is trusting almost entirely to domestics the making of this *most important* part of table luxuries. *They* do not feel for the interest and happiness of the family as the mistress of the house should. We do not trust them with the superintendence or making of our preserves, jellies, marmalades and nice cakes. Then, *why* leave to their judgment and discretion the *greatest* and *best* part of all life's cookery? Our mothers never did so! There lies one secret of the delightful bread of our childhood, the remembrance of which, even now, makes our mouths water, our eyes moisten at associations of the past, and our senses recoil from the appearance of much of the bread placed upon our tables at the present day.

There is too much indifference shown on this subject, too much carelessness and negligence, and as long as this continues, we need not be surprised at often meeting with poor bread. The worst of it is, that many persons are not aware that their bread is half sour, so accustomed have they become to eating such. When they meet with delicious sweet bread at other homes, they are in ecstasies over it!—wonder *why* they never can have any like it—compliment it over and over—get directions for the process of making, and there the matter ends. Indolence and procrastination prevent them attempting any reform in their own miserable mode. Thus a

whole life-time passes away without any radical change in the bread making department of a family.

It is high time for our scientific men, our chemists, and our literary ladies too, to rouse up and *speak out* on this subject. They should give the *theoretical* knowledge they possess to the wives and daughters of our wheat-growing State, that they may *practically* teach it to the coming generation. Mothers should feel it to be a sacred duty to teach this all-important accomplishment to their daughters while under their own immediate care.

In our republican country, where there are so many reverses of fortune, so many vicissitudes in the lives of our women, it is really necessary, for their own comfort and peace of mind, as well as for the happiness of the dear home circle around them, to be perfectly acquainted with *all* household duties. But far above all other knowledge of domestic economy, as the highest and noblest, should be ranked a thorough training in good bread making. In the opinion of the writer, no lady, whatever may be her social position, her education, her accomplishments or literary attainments, is really qualified to become the mistress of a family until she thoroughly understands how to make and bake good, light bread. The "strengtheners of our spirits," "the staff of life," the indispensable article of diet on all the tables of high and low, rich and poor, is of too much vital importance to be thought of lightly, or totally disregarded, till after marriage. How many hours of anxiety and vexation would be prevented, how many bitter tears would remain unshed, did young ladies become acquainted with such works of utility while underneath the parental roof.

There is a case in my own experience, where an acquaintance of the "whys and wherefores" of the matter would have spared me much vexation and a deal of trouble, but which in the end was productive of great benefit to myself, as it led me to reflect on the subject, and consequently investigate the whole process more deeply than I had ever before done. A young male relative, from one of the Middle States, famed for its good cooks and excellent bakers, paid us a visit of a few weeks. At the same time, a matronly cousin, from another State, (herself one of the best of bakers,) with her daughter and aunt, were also our guests. Priding myself upon having all our culinary arrangements of the *first order*, and above all, trying to have the *best* of bread, I signally failed in my first attempt! Chagrined and mortified beyond expression, vexed at myself and everything about me, I determined

this *never should occur again*; and with the best grace possible, made the most of a bad failure. Living miles from a bakery, I had no resource, only to throw the whole batch away, which economy forbade, or make it into toast or batter-cakes, adding saleratus to the milk to destroy the acidity of the bread. The latter method was adopted. With renewed assiduity and buoyant expectations, I tried my skill on another trayful of flour, which certainly would make ample amends for all the pooriness of the last. It was made and attended just as all my hitherto good bread had been. It rose but partially. In the moulding out it was kneaded with extra care, and made into smooth, beautiful loaves. During the raising, it was faithfully attended, turned, kept warm, and watched with all the solicitude of a mother over an ailing child, for was not my reputation as a good baker at stake? Had we not two superior judges sitting at our table three times each day? Could I sit down or rise up from table with a pleasant countenance when such an unsightly object as a dish of bad bread stared me in the face as it did the day previous? No! I could not endure it. This bread *shall* be good! Soon, instead of rising up quickly, the dough began to grow thinner and spread out until flat and even with the top of the pan. As a necessity, to prevent it running over, I put it to bake, my highly wrought expectations all taking their flight. The result of such looking dough was coarse, dark bread! More mortified than ever at having the second defeat, the blame was laid upon the miller—upon that horrible flour; we would never again patronize that mill—never! It was too bad to be served so, and paying as we did, too, for *extra* family flour! I will send it right back to the mill, or make it all into starch, though it's hardly fit for that! The idea of having such bread the *second* time made me miserable all day, and at night, on my couch, I pondered upon it. *Why* was it thus? Now, of all other times of my life, when such competent judges were testing my ability and experience in the housekeeping line, I could never again hold up my head among good bread makers. I would hide myself in some corner when the subject was discussed, and would give up all pretensions to success in that common part of housekeeping. I could have cried from pure vexation, had I not deemed it sinful. Resolution and perseverance, however, came to my relief, and suggested "try again." Just then, when my heart was really more troubled than ever before on a similar occasion, a happy thought occurred to

me: "Change the yeast!" Ah, that's it! Early in the morning a child was dispatched to a neighbor, and procured some new, light yeast. The flour was warmed and sifted, another effort was made, and lo! light, white, sweet bread was made from that same barrel of flour! The new yeast contained some properties which my old yeast had lost by long keeping, dampness and other causes which I did not understand. Never did I feel more truly thankful for a like comfort, nor rejoice more over a baking of bread than I did over that one. The irritability that I felt every time the poor bread came in my sight, with the attendant grumbling at the badness of the flour, were all done with. I really felt happy, and like a new person. Of course, as a natural consequence, the whole family had, more or less, partaken of all these bad feelings for some days, for who can feel well or pleasant when they make, see, or have occasion to eat poor bread? Now, all was hilarity and good humor. Witty sayings, rich anecdotes, complimentary remarks and sage suggestions, poured forth in copious effusions during our social repast—all produced by having good, eatable bread.

Thus we may, by a little reflection, analyzing and moralizing, trace out the intimate connection between good bread and the comfort, well-being and happiness of a whole family.

AMONG THE BUTTER MAKERS OF ORANGE CO., WITH SUGGESTIONS ON CHEESE DAIRYING.

RY X. A. WILLARD, A. M.

[From the Transactions of the New York Agricultural Society.]

We have been among the butter makers and have seen the nice yellow cream turned into golden butter. Every one who has lived much on a farm has seen a similar thing done a thousand times, but yet only one in—well, perhaps a thousand, though butter makers all their lives, can manufacture that which is strictly prime.

Orange county has long been noted in the New York markets for producing a superior quality of milk. The butter manufactured there has for years brought the highest prices, and has acquired a world-wide celebrity. This reputation could not have been maintained for so long a period without some foundation in point of merit above that made in other localities. In the course of the present article we hope to present some light on this matter, and give to the dairymen of central and western New York facts which if turned to account may be the source of increased wealth to the great dairy district.

For the past two years we have made extended tours throughout the dairy region and examined the character of soil and farming over a large area, and it was a matter of interest to discover, if possible, why it was that the best butter of Oneida, Lewis, Jefferson and Herkimer was selling for no more than 40 to 45 cents, while that of Orange county was eagerly caught up at 70 cents per pound.

If our farmers can divest themselves of the miserable vanity in believing that there is nothing to be learned as regards butter making, then there is some hope for improvement. But so long as they insist that they know the whole art, and continue to throw upon the market a yellow grease, unequal in color, salvy, destitute of flavor except of a negative character, or positively bad, then we can hope for no material change either in quality or prices compared with an article that is really good. Humiliating as the

statement may appear, there is abundant evidence to prove that the great mass of butter made in Oneida, Herkimer and the adjoining counties is poor. There are and always have been some good butter makers scattered here and there over the central counties, who manufacture that which is good as the best, and this proves conclusively that the central section of the State is not deficient in soil, climate and grasses for competing in this line with other districts that have acquired an enviable reputation in the manufacture of prime butter.

We have made a very careful examination of the matter, and after having taken a tour through Orange county, with a view of arriving at all the facts in the case, we must conclude that the cause of our faulty butter lies for the most part in want of knowledge as to the treatment of the milk and cream, together with a careless and slovenly manner of manufacturing and putting up butter.

Topographical Features of the County—Character of the Soil, etc.

We arrived at Newburgh on the evening of October 31st, and passed through the towns of New Windsor, Blooming Grove, Hamptonburg, Chester, Goshen and Walkill, thus seeing a considerable portion of the great milk region of the county. Orange county is broken up into numerous hills and valleys. The southern and eastern parts are mountainous. The great valleys run in a northeasterly and southwesterly direction. The Shawangunk mountains are at the northwest, and along the northern borders of the county flows the Shawangunk-kill, a considerable stream which empties into the Wallkill. The Wallkill, rising in New Jersey, passes in a northerly direction through the central portion of the county and into Ulster county, emptying into the Hudson at Rondout. It is a sluggish stream, except in times of high water, in spring and fall, but furnishes abundant and durable water power along its entire course. Along the valley of the Walkill are some of the best farming lands in the county. There is a diversity of soil in the county, gravelly and sandy loams, light and heavy clay loams, and alluvial soils. The interior of the county is a rolling upland, broken in many places by abrupt and isolated hills and the valleys and streams. In the town of Blooming Grove, the lands are undulating, but in some places broken by ridges of rocks. The soil is generally a clayey loam, running sometimes into a gravelly loam, and, adjoining the ridges of slate rock, becoming a sandy

loam. West of the valley of the Wallkill, the prevailing soil is a clayey loam well adapted to grazing. It is in this district that the famous Goshen butter is produced. Here abound the natural meadows which have not received a plow for more than a hundred years. The soil on these meadows is a black earth, made up from the wash of the hills and slopes, and is rich in vegetable mould. In some parts the soil is slaty, and strips of land occur that are stony, being filled with boulders and fragments of rock, but the whole section seems to be fertile and productive of grasses that are sweet and nourishing. The water is pure and the climate healthy. Soft and hard water are often found upon the same farm. A considerable portion of the surface of Orange county is occupied by the Hudson river group of rocks, which takes a northeast and southwest direction. On the banks of the Hudson, above Newburgh, is found the Utica slate. The Trenton limestone is found near Mount Lookout, in Goshen, and in the adjoining town of Hamptonburgh. The Black river limestone is found in Goshen, and is the rock of which Mount Lookout is made up.

The Grasses.

In the old pastures there are several varieties of grasses, that spring up spontaneously, and afford sweet and nutritious feed, and from which the best qualities of milk and butter are produced. These grasses form a rich, thick turf, leaving no intervening spaces. In our conversation with farmers, much importance was given to these natural grasses as a means of securing the richest milk and the finest butter, and some affirmed that it was impossible to obtain the best flavored butter or so large a result from recently re-seeded grounds of clover and timothy. These grasses are similar to those found in the old pastures of Herkimer, Lewis and Oneida—they embrace the June or blue grass, the fowl meadow grass, *poa serotina*, meadow fescue, *festuca pratensis*, red top, *agrostis vulgaris*, the wire grass, *poa compressa*, and the sweet-scented vernal and vanilla grass. Timothy, orchard grass, red clover and other forage plants are also grown in pastures and meadows. The sweet-scented vernal grass grows best upon the moist soil of the old meadows. It starts very early, and gives off an agreeable odor. The June grass is regarded as very valuable, throwing out a dense mass of leaves, highly relished by cattle, and from which a superior quality of butter is made. It is found growing throughout the butter districts of the county. The wire grass is deemed one of

the most nutritious of the grasses, is very hardy, eagerly sought after by cattle, and is one of the best grasses for fattening. Cows feeding upon it yield milk of the richest quality, and from which the nicest butter is made. It flourishes well upon gravelly knolls and in shaded places, and its stem is green after the seed has ripened. It is found growing in all parts of the county. The meadow fescue is common in the old grass lands where the sod is thick and grasses of different variety mingled together. It starts up early in spring, is relished by stock, and furnishes good early feed. The milk farmers hold it in high estimation as a reliable grass, tenacious of life, and not running out like timothy or clover.

We have been thus particular in describing the soil and grasses of Orange county, that farmers in other sections may make a comparison with their own lands, and be better able to judge wherein the one differs from the other. We may remark here that weeds common in other sections are common also in Orange county. The white daisy, the thistle, the golden rod, the fire weed, the snap-dragon and other weeds seem to be common to the county. West of the Wallkill, farmers complain of the snap-dragon as the worst weed against which they had to contend. The daisy is not regarded as formidable, since manuring with barn-yard manure, salt and plaster, it is said, would rid the land of this pest. The rag weed, we observed, was common in cultivated grounds, but it is said did not trouble grass lands.

Farming, Value of Land, &c.

The manner of farming in Orange county, we should judge, was generally no further advanced than in the central counties of the State. In some respects the Orange county dairyman is behind. "Milk barns," or buildings specially designed for stabling and confining the cows during milking, are not so common as in Oneida, Herkimer and the adjoining counties. On many of the farms the cows are milked in the open yard, unless during rainy weather, when they are put in the winter stables, or under the sheds. There are more sheds in connection with the barns than in central New York, and in this respect the barn structures are similar to what they were here fifteen years ago. Farms are divided up into small enclosures, varying from three to ten acres, and sometimes the fields are large. These are generally surrounded by low stone walls, and many of them tumbling down, showing great age. The road fences are low, generally a wall with stakes and rider.

We remarked to some of the farmers that it looked like a waste of land and labor, in a dairy region, to keep up so many fences upon the farm; but the reply was, that this style of farming was deemed most convenient, and admitted of frequent changes of pasture for the herds, which it is believed gives more and better feed than when one pasture is used. West of the Wallkill is esteemed as a tolerably good fruit region. New orchards began to be set some fifteen years ago, the old trees having died out. Peaches and grapes are grown to some extent in the county.

The Stock.

The herds are usually made up of native and grade cattle. In the milk dairies there is no particular prominence given to thoroughbreds any more than in other localities of the dairy region. There is a sprinkling of Shorthorns, Ayrshires, Devons and Alderneys, and occasionally some Swiss cattle. These last are curiously marked—the head, fore quarters and hind quarters being black, and the body being surrounded with a white belt. They are esteemed by some as good milkers, and are admired for the peculiarities by which they are marked.

The farms are not generally above a hundred acres. Mr. Slaughter, who has an excellent farm about a mile and a half west of the Wallkill, will carry 45 head of cattle upon 150 acres. His farm contains 175 acres, 25 of which are in timber. He usually has about 12 acres annually under the plow, raising corn, oats and wheat in rotation, and then seeding down to grass, and this is the rotation usually followed in this section of the county. The soil here, and generally through the county, is well adapted to corn, and the average crop will reach 50 bushels per acre. Wheat yields 25 bushels per acre, and oats from 60 to 70 bushels. Farmers generally do not believe in feeding down pastures close, so as to expose the roots of the grass to a burning sun, but rather seek to have the ground covered at all times with a good growth of herbage. Pastures generally presented a different appearance in this respect from those in Oneida and Herkimer, there seeming to be much more grass upon the ground than in those counties.

We saw no fields overrun with Canada thistle, and from what we learned it appears that this weed has not obtained the foothold in Orange county that it has elsewhere in the grazing districts. In the town of Wallkill, land is valued at from \$70 to \$150 per acre, according to quality, location and improvements. The farm ad-

joining Mr. Slaughter's sold, last spring, at \$150 per acre. It contained 100 acres, with new buildings, large and commodious.

System of Organizing Factories.

The factories are managed on a little different plan from those in the central counties. The farmers of a neighborhood join together and erect the buildings, each one paying in proportion to size of farm or number of cows from which milk is to be delivered. After the structure is completed and furnished, a superintendent is chosen, and help hired for running the factory, and the expenses are shared by stockholders, in proportion to the amount of milk delivered. Repairs, additions, &c., from year to year, are added to the expense account. Last year, at the Wallkill Creamery Association, the expense account for labor amounted to a fraction above two mills per quart, and the gross proceeds from sales gave to the farmers five cents and two and a half mills per quart, wine measure. The cost of erecting a factory, and furnishing it throughout for 400 cows, is estimated at \$10 per cow.

The Captains—Marketing Butter.

The manner of marketing butter differs from that practised in other sections. Consignments are not generally made direct to the New York dealers, but shipments are entrusted to captains, as they are called, or persons who make it a business to collect freight and take it in charge to New York, making the sales and returning the proceeds to the manufacturer. These captains go with their freight twice a week, are men of standing and responsibility, who are well posted in the trade, and know how and where to obtain the best prices. They receive a commission for their labors, and find it to their interest to make good bargains, otherwise they would lose the confidence of those entrusting freight to their charge, and would therefore be displaced. These captains often receive proposals or offers for large lots of butter, which are submitted to the factories, when they are rejected or accepted, as seems best to the parties interested.

The Milk Business.

Since the construction of the New York and Erie Railroad, large quantities of milk are daily shipped to New York from the several depots. The milk trains start out of Goshen and Middletown late in the afternoon, and milk is shipped only once a day. A portion

of the milk, when it arrives in New York and is ready for the milk carts, is thirty-six hours old. To carry milk sweet for that length of time, in hot weather, requires some art in handling, and this seems to be well understood by the Orange county farmers. The milk, as soon as it comes from the cow, is strained and put in long tin pails, which are set in water, care being taken that no portion of the milk be higher than the water. These pails look like sections of stove-pipe, being eight inches in diameter, and from seventeen inches to twenty inches long. The milk is occasionally stirred so as to keep the cream from rising. It is deemed important that the animal heat be removed as soon as may be, at least in an hour's time after it comes from the cow. The old plan which is yet practised by some, is to cool the milk in the cans, but it is regarded as a very unsafe way when it is designed to have the milk keep sweet for a considerable length of time. The milk stands in the pails until ready to be carted to the trains, when it is put in cans holding from fifty to sixty gallons. These cans are filled full, and the cover, which fits close, adjusted. Sometimes when there is not enough milk to fill all the cans, a little water is added to fill up, but not in sufficient quantity to reduce it below par. Some make their contracts to furnish par milk during the season, and in this case during the fall when milk is rich water can be added so as to reduce it to the required standard. Within a few years past, *creameries* have been established within convenient distance along the route of the railroad, where the milk is cooled, and from thence shipped to the depot. Here farmers daily deliver their milk, night and morning, as at our cheese factories, where it is measured and credited, and no further trouble is had with it on their part. At the creameries a part of the cream is taken off the milk, put up in cans, which when ready for shipment are set in wooden tubs, made so as to be tapering towards the bottom. The space between the cans and tubs is then packed with ice, and the cover fastened when it is ready for shipment.

Milk in October, 1865, was selling at the creameries at 7½ cents per quart. The springs for cooling the milk, and the construction of the spring-house, are all similar, and will be described hereafter.

The Butter Factories.

An allusion has been made to the lands in the neighborhood of Goshen and west of the Walkill, as being noted for producing a fine quality of butter. Within the last five years great improve-

ment has been made in butter making, by the establishment of butter factories, where the highest skill is brought to bear in producing the best article that can be made.

The system is a progressive step growing out of the establishment of the creaming associations, which are now being modeled on this plan. These butter factories have, in a measure, been forced upon the farmers in self-protection. Where milk was regularly delivered at the depots for the New York markets, the prices were of course somewhat under control of city operators, and the farmer submitted to abuses because he knew no way to relieve himself from combinations formed against him. The system of butter factories renders him perfectly independent of the milk trade. In other words, he dictates to the New York dealers the prices of milk. If they are met, all well enough, but if not, he goes to manufacturing butter and cheese. He therefore sees a sure way out in any event, and is not at the mercy of speculators, who, entering into combinations, had everything pretty near their own way. The establishment of butter factories has been a great success, because they have been enabled to turn out a very superior article, uniform, and one that can be relied upon in the market. This uniformity and superiority in quality and flavor of the butter made at these establishments are such that it is eagerly sought after and commands extraordinary prices. The butter factories in October, 1865, were offered 70 cents per pound for all they could make, and the probability was that a still higher price would be reached, because there are always those in the cities who will have the *best butter*, let the price be what it may, in preference to taking an ordinary article at ordinary rates. And it may be remarked that the butter manufactured here is of that peculiar flavor that those having once tasted it will not soon forget it, and ever afterward will feel dissatisfied with an ordinary article.

Desiring to see the working of the new system, and to examine the processes of treating the milk and cream in all its parts, until deposited in a golden mass in the tubs, we took a carriage at Goshen, and passing through the northwestern part of the town, crossed the Wallkill to the parent butter factory of the county. It is located about half way between Goshen and Middletown, in the town of Wallkill, and is known as the

Wallkill Creamery Association.

Here we met our good friend Alanson Slaughter, manager-in-

chief of the association, who politely showed us over the premises, and explained the different parts of the system. The main building consists of a two-storied structure, arranged on a plan similar to our cheese factories. Below are the vats, presses, &c., for making cheese, and above is the dry-room. On one end of this building is erected the spring-house, containing two rooms, the one 12 feet by 16 feet, and the other 14 feet by 24 feet. It has windows and doors for ventilation. The packing and churning room is a separate building, 12 feet by 24 feet, and stands opposite the spring room, with a narrow alley between. Adjoining to and connected with this is the horse-power for churning, and a store-room. The establishment receives the milk from 400 cows, and after the cream is taken from the milk, the milk is made up into skim cheese.

The Springs and Manner of Treating the Milk.

There are two springs in the spring-house—one is of soft water, and the other happens to be slightly tinctured with iron. Vats are constructed about the springs for holding the water. They are three in number, twelve feet long by six feet wide, set down even with the floor and with racks in the bottom for holding the cans. The water flows up through these racks and above them to the depth of seventeen inches. The pails are twenty-two inches long, and eight inches in diameter, and as fast as the milk is received they are filled within five or six inches of the top, and immediately placed in the water. Care is taken that the surface of the milk in the pails is not above that of the water in the spring. The pails are set close together, and one spring will hold 2,040 quarts of milk. The spring should have a sufficient flow of water to divest the milk of the animal heat in less than an hour. Mr. Slaughter regards 56 deg. as the highest temperature that the water of the spring should be for conducting operations successfully. He has not yet determined the precise temperature of water best adapted for obtaining the most cream from the milk, but is satisfied from his experiments that the natural temperature of the water should not be below 48 deg. nor above 56. He says, more cream, and that of better quality, for butter making, can be obtained, by setting the milk on the above plan, than shallow in pans. The object is to expose as little of the surface of the milk to the air as possible and that surface should always be in a moist atmosphere, in order that the top of the cream may not get dry, which has a tendency to fleck the butter, and injure its flavor.

The milk of one day is left in the spring until next morning, when it is taken out, the cream dipped off and put immediately in the churns. In removing the cream, a little tunnel-shaped cup, with a long upright handle, is used. It is gently pushed into the pails and the cream dipped off. It is very expeditiously effected, and the milk line easily determined by the appearance of the milk. The cream in the fall of the year, and in spring, is churned sweet. In summer, the cream is dipped into the same pails and returned to the spring, and kept there until it sours. As fast as the cream is removed, the milk in the pails is emptied into the vats for making skim cheese.

The Churn-Room and Churning.

The churning is done by horse-power. The churns are the common barrel and a half dash churn, four in number, and are placed on each side of the power, so as to be all worked together. About fifty quarts of cream are put in each churn, and each then receives a pail of cold spring water and the mass is brought to a temperature of 63 deg. to 64 deg. In warm weather ice is sometimes broken up and put in the churn to reduce the temperature to 56 deg., but it is deemed better to churn without ice if the cream does not get above 64 deg. in the process of churning, as butter made with ice is more sensitive to heat. It is, however, a less evil to use ice than to have the butter come from the churn white and soft. It requires from forty-five minutes to an hour to churn, when the butter should come solid and of a rich yellow color. It is then taken from the churns and thoroughly washed in spring water. In this process the ladle is used, and three times pouring on water is generally all that is required. It is then salted at the rate of one pound and two ounces of salt to twenty-two pounds of butter. In making winter butter a little more salt is added at the last working. The butter, after having been salted and worked, is allowed to stand till evening, and is then worked a second time and packed in 60 lb. pails and shipped twice a week to New York.

At this factory, in hot weather, after the butter is salted and worked over, it is taken to the spring and immersed in the water where it remains until evening, when it is taken out and worked over and packed. For winter butter a small tea-spoonful of pulverized saltpetre and a large table-spoon of white sugar are added for the twenty-two pounds of butter at the last working. No coloring matter is used in butter at this establishment.

The butter is worked on an inclined slab with beveled sides running down to the lower end and within four inches of each other. A long wooden lever, so formed as to fit in a socket at this point, is used for working the butter. It is a very simple affair, and does the work effectually. In churning the dashers are so arranged as to go at every stroke within a quarter of an inch of the bottom of the churn, and rise above the cream in their upward stroke.

When butter is packed in firkins, none but those made of white oak are used. These firkins are very handsomely made, and are tight so as not to allow the least leakage. Before using they are soaked in cold water, and after that in hot water, and then again with cold water. After being filled with butter they are headed up and strong brine poured in at the top to fill all the intervening spaces. The pails for holding the milk in the springs are thoroughly cleaned with soap, rinsed in spring water, and put on a rack to dry. In furnishing a factory two pails are allowed for each cow, as it is necessary to have a double set.

The Cheese.

In making the cheese, the milk is set at 82 deg.: highest heat, 96 deg. to 98 deg., and three pounds of salt to 100 of curd. The curd is pressed in 16 inch hoops, and cheese made about four inches high. We bored a number and tested their quality; they are of a very good flavor, and by no means unpalatable—though of course, inferior to pure milk cheese. These cheeses are shipped to warm climates, and many of them go to China in exchange for tea. Their value has been constantly increasing, as the markets have been opened for this character of cheese, and it has sold this year, 1865, for as much as best factory whole milk cheese, and sometimes in advance.

It is believed, if the quantity could be increased, other markets would be opened, so that the cheese would always sell for as much as the pure milk cheese, and perhaps in advance of it, since it seems to be better adapted to warm climates and better suited to the tastes of people living under a burning sun, where less fat is required than in our cold climates.

Record of Results from a Given Quantity of Milk.

Mr. Slaughter has only from time to time made a record of a single day's work—his books being arranged for monthly statements. Among the single day's results are the following:

On May 18th, from 3,512 quarts of milk, wine measure, there were produced 213 pounds of butter and 560 pounds of cheese ; May 26th, from 3,300 quarts of milk, 210 pounds of butter and 550 of cheese ; September 12th, from 3,128 quarts, 200 pounds of butter and 546 pounds of cheese ; October 14th, from 2,027 quarts of milk, 120 pounds of butter and 407 pounds of cheese.

Take the result, for instance, of May 18th : The 3,512 quarts of milk by the old system would make, say 800 pounds of cheese, which at 18 cents, would come to \$144.00. But by the Orange county process, 213 pounds of butter at 70 cents, come to \$149.10, and the 560 pounds of cheese at 18½ cents, come to \$104.60, or for both, the sum of \$252.70, making a balance in favor of the Orange county farmer, on the same quantity of milk, of \$108.70. Is not that sum too much to lose ?

In the above estimate we have made a very liberal allowance for the quantity of whole milk cheese to be made from 3,512 quarts of milk ; the average at factories from this quantity of milk would hardly exceed 760 pounds cheese.

Orange County Milk Association.

This establishment commenced operations in 1862. The main building is 60 feet by 24 feet, and is located about four miles north-east from Middletown. The number of cows from which milk is delivered is 550, and the farmers owning the building number thirty. The construction of the building and spring-house is similar to that of the Wallkill Association. There are two spring-rooms, each 10 feet by 24 feet. The buildings here are hired by a company at an annual rent of ten per cent. on cost, and milk purchased of farms at three-quarters of a cent less per quart than New York prices at Goshen or Middletown stations. The water here is soft, and stands at a temperature of 50 degrees. At this establishment, large quantities of milk and cream are put up for the New York market. About \$20,000 worth of cream and \$30,000 of milk have been shipped this season.

The milk, as soon as received, is put in the pails and set in the spring to cool, and starts for the station each day at 3 o'clock P. M. A part of the cream and milk is made into butter and cheese. The estimated amount of butter made in 1865 is 15,000 pounds, and cheese 90,000 pounds.

From experiments made at this establishment, it takes on an average during the summer fourteen quarts, wine measure, of milk,

to make a pound of butter and two pounds of cheese. Estimating a quart of milk, wine measure, to weigh two pounds, it will be seen that twenty-eight pounds of milk yield three pounds of butter and skim cheese—or one pound from nine and one-third of milk. The average quantity of milk required for one of cheese at our factories in 1864 was nearly ten pounds, but as the butter product is fully three times of more value than cheese, it will be seen that a much larger profit is realized by the Orange county farmers. Mr. Geo. W. Allison, the manager of the establishment, stated that at present prices (October, 1865) for milk and cream, seven cents per quart for the former, and thirty cents for the latter, it was more profitable to make butter and cheese than to sell the milk or cream. About two thousand quarts per day were being received October 30th. When butter is made, all the buttermilk is readily sold to the farmers, at the rate of 15 cents per 40 quarts. For 15,000 pounds of butter there will be 30,000 quarts of buttermilk. The butter is manufactured here in the same manner as at the Wallkill Association, and Mr. Allison remarked in reference to salting, that to suit the New York markets the butter was made fresher or with less salt than for home use. Sales of butter were being made in pails and packages at 70 cents per pound, and skim cheese at 18½ cents.

At this establishment, in addition to the spring-room there is a cellar 12 feet by 14 feet, with walls nicely laid up with stone, and extending into the bank, at the rear end of the building. Here the butter is stored in summer as soon as packed, where it remains until ready to be shipped.

In the fall of the year, when cream does not readily sour, it is put in the churn in the evening and a can of water raised to 100 degrees set in the cream. It is left there over night, and by morning the cream sours.

Skim Cheese Again.

The cheese is made from skim milk under the same process as at the Wallkill factory. They are pressed in fourteen inch hoops 5 inches high, and weigh about thirty-four pounds.

The size of dairies delivering milk here run from five to twenty-five cows, and the size of farms 100 acres. The cows are mostly pastured in old pastures, the soil being a clay loam. The average value of land in this section is \$80 per acre. The cheese from this factory is handled by J. S. Martin and B. F. Tuttle, of New York. About 80 hogs are kept at the factory and fed upon the whey.

Middletown.

Middletown is situated upon the New York and Erie railroad, in the south part of the town of Wallkill, and is the second largest village in the county. It contains seven churches, three banks, two printing offices, an academy and other schools, carpet-bag factory, factories for manufacturing files, grain cradles, sash and blinds, and hats, with places for conducting other branches of industry. It a thriving business town, and has many beautiful private residences.

Provost's Orange County Milk Works—Condensing Milk.

We went up to Middletown on the morning of Thursday, Nov. 2d, to look over the establishment of Stephen H. Provost, for condensing milk. The factory stands in the village, and was being re-fitted with new apparatus and improvements, and was therefore not in operation. Here we found Dr. C. E. Crane, the gentlemanly and intelligent superintendent, who took us over the premises and explained the various apparatuses for manipulating the milk.

The process of evaporation here, it is claimed, is new and requires less heat than by the usual method, thereby giving a brighter color to the condensed milk, and at the same time avoiding a burnt flavor. Milk is reduced and prepared in two forms at the factory. That which is run off without the addition of sugar is called condensed milk, and when sugar is used, concentrated milk. During the summer about 3,600 quarts per day are received at the factory. The milk is weighed and tested when received, and emptied into long pails holding twenty quarts, similar to the pails used at the butter factories for cooling the milk. About eighteen quarts are put in each pail, and after the milk has been cooled to sixty degrees in order to divest it of animal heat and expel the ammoniacal gas, the pails are immediately plunged into a vat of water heated to a temperature of 185 to 190 degrees. Refined loaf sugar is added at this stage at the rate of four pounds for each pail or can. It is kept in the vat of heated water about thirty minutes, when it is poured into an immense pan having fifty corrugations which sets over water and upon a furnace in the adjoining room. Here are arranged two large fans directly over the milk, which are kept in motion by machinery, and the temperature of milk while evaporation is going on, being 160 degrees. The fans carry off the water, forcing it through ventilators, out of the building, as fast as it is formed in vapor. It takes about seven hours to condense the milk,

75 per cent. of its bulk in water being driven off. The faucets at each end of the pan are then opened, and the condensed fluid passes through fine wire strainers or sieves, into large cans. These cans, when filled, are rolled away to the tables, where their contents are drawn off into small tin cans, holding a pound each, and are immediately sealed up. The milk when condensed, has the consistency of thick molasses, and is sold at from 25 to 40 cents per pound, according to the price of milk in the New York markets. The cans are packed in barrels, with saw-dust, and are shipped to the markets—the milk being used in the navy, and in hospitals, and sent to warm climates.

Dr. Crane informed us that milk, thus prepared, will keep good for years, without the least trouble. He opened cans in our presence that contained the preparation two years old, and we found it of good flavor and, apparently, not injured from age. It has a rich creamy taste, rather sweet, with a flavor of boiled mild, but by no means unpleasant. The Doctor informed us that specimens recently put up had a much fresher taste, and make a nice dressing for buckwheat cakes, and for which it was much used. He claims that his process of evaporation and condensing is superior to that of Borden's inasmuch as a lower heat is employed, avoiding burnt flavor and injury to the creamy particles. The manufactory is arranged so as to be kept very neat and clean, and we have no doubt but the article manufactured here would be a great desideratum to those finding difficulty in obtaining fresh milk. The price paid for milk at the factory, during the summer has ranged from 4 cents to 5½ cts. per quart. In winter the price paid has been 7½ cts. per quart.

Rockville Milk Association.

From Middletown we went north, taking the Middletown and Blooming Grove plank road to the Rockville Milk Association. Land in this section is a heavy clay loam, and it is a fine grazing district. The factory stands near or adjoining a wet and springy piece of ground, covered with fragments of rock from the Shawangunk Mountains. The buildings were erected a year ago, and have some improvements in construction over the older factories. The main structure is 25 by 50 feet—two stories, which are used for manufacturing and curing cheese—adjoining this on one end, is the spring-room, and on the side running back in the shape of L, is the churn-room, 20 by 30 feet. On the end of the churn-room.

is the ice-house, which is arranged so as to lead out of the churn-room with a broad hall or alley, which serves as a cellar for storing butter.

This hall has double sides packed in with tan-bark, and the ice-house being on one side, with communication by door, makes it a cool and nice place for keeping butter or cream in summer. In the spring-room there are two vats, one nine feet by twelve feet, and the other eight feet by twelve feet, sunk even with the floor, and arranged so as to be filled from one spring. The temperature of the water is 48°. It is soft water, but less so than those at the other factories to which we have referred. The delivery of the milk is at a window and on a platform the height of the wagon. As the teams drive up, the cans are slid upon the platform and emptied into a large square receiving box or can of tin, inside the window, standing upon platform scales, where it is weighed, and then conducted out by two faucets into the long tin pails or coolers. The cost of structure and fixtures was \$3,000. The number of cows from which milk is delivered is 425, and on November 1st the receipts were 1,800 quarts—estimating a quart, wine measure, to weigh two pounds. Milk varies in weight, and a wine quart weighs, at some seasons of the year, a trifle over two pounds. During the month of May, when cows are in pasture, Mr. Slaughter finds that 100 quarts, wine measure, will weigh 211 pounds. The milk here is kept in the spring from 24 to 36 hours, when the cream is taken off and allowed to sour, and then churned. Mr. Uptegrove, the superintendent of the factory, informed us that about one-tenth more butter is obtained from the cream when churned sour than when sweet. At this season of the year (Nov. 2) the cream is taken off and deposited in the long tin pails and immediately carried to the churn-room, which is kept by means of a coal stove at a temperature of 60° to 65°. Cream two days old when taken off will require from two to three days before it will sour or thicken in the churn-room at the above temperature.

Butter Making, &c.

The churns are the barrel and half-dash churn, and are filled about half full of cream, which is diluted by putting in cold water in summer and warm water in cold weather, at the rate of sixteen to thirty quarts for each mess or churning. The temperature of the cream in summer, when the churns are started, is about 60°, but in cold weather they are started at about 64°. When a mess

of cream is to be churned the churns are filled about half full and a pail of spring water added to dilute the cream; in warm weather cold water is used and in cold weather warm water, so as to make the mass at a temperature of 60° to 62°. The temperature of the cream while churning should be kept below 65°, for if at the close of the churning the buttermilk should be at a temperature above 64° the flavor and color of the butter are injured. When the butter begins to come, the churn is rinsed down with cold water. After the butter is taken from the churn, care is taken not to touch it more than is necessary with the hands. The butter trays are elliptical in shape, and the ladle is used for turning over the butter while it is being washed. In salting and working over, the whole is done by the butter-worker heretofore described, and great care is taken not to work it too much, as overworking spoils the grain and makes the butter salvy. A 22-pounds batch is laid upon the inclined slab or butter-worker, and the lever applied, first beginning at one side, until the whole is gone over. Only a few manipulations of this kind are required, and we were surprised at the expedition by which this part of the process was effected. The salting and working of the butter is by the same rule adopted at the other factories, eighteen ounces of salt being used for twenty-two pounds of butter.

The butter-worker is similar to the one alluded to, except that the lever is diamond shaped, which it is claimed is an improvement. The inclined triangular slab on which the butter is worked stands upon legs, and has beveled sides about three inches high. It is four feet long and twenty-five inches wide at the upper end, tapering down to five inches at the lower end. At this point there is an opening for the escape of the buttermilk into a pail below. In salting, the butter is washed and then spread out with the ladle upon the worker, and fine pure Ashton salt sprinkled over the mass. It is then turned over a little with the ladle and afterwards worked with the lever.

At this factory there was a little contrivance consisting of a wheel and lever and weight for regulating the stroke of the dashers when churning. The trays are elliptical, being 2½ feet long and 1½ feet across, and will hold 25 pounds of butter. The butter is packed in Orange county pails or tubs holding 60 pounds, or in oak firkins of 80 pounds, as at the other factories, and shipped twice a week to New York, bringing 70 cents per pound. The association is composed of 28 farmers who have dairies running from five to ten

and up to thirty cows. Four farmers not belonging to the association deliver milk here and are charged \$1.50 per cow extra.

The cheese is manufactured out of skim-milk, and by the same process as at the other factories. They are pressed in sixteen-inch hoops, six inches high, and weigh about 35 pounds each. The 1,800 quarts of milk received per day, at this season of the year, after the cream has been taken off, will make nine skim-milk cheeses.

Labor Employed.

Besides the superintendent, three hands are employed at the factory—two men and one woman. The butter-maker and his wife get \$50 per month and find themselves in board, &c.; the remaining hands get \$20 per month and board. At all these factories, Ralph's Oneida vat is in use for cheese making, and gives universal satisfaction.

We have now laid before our readers the Orange county system of conducting the dairy, and believe it affords valuable suggestions to the dairymen of the central counties. If dairymen will read this article attentively, they cannot fail to see that, as far as profits are concerned, much more money is to be made by this system than by making cheese alone. The establishment of butter factories does not wholly concern the farmer, and could a limited number be set in operation throughout the central counties, the public would be greatly benefited, since good butter then could at all times be had.

Old Notions Exploded.

We have been taught to believe that cream could not make its way through deep milk; that the milk must be set very shallow in pans in order to obtain the best result, together with other points which we are assured by the butter-makers of Orange county are mere traditionary fables, having no foundation in fact. We are not prepared to give an opinion in the matter, or at least we do not choose to express it just now, but hope the suggestions thrown out in this paper will lead some of our farmers to experiment a little more in milk with a view of satisfying themselves of the real facts in the case.

Advantages of this System.

It will be readily seen that the advantages of this system in conducting the dairy are very great. Large profits are realized by the farmer since the milk is more thoroughly worked up and with

less loss, while at the same time the butter product will bring from three to four times more than it would if made into cheese. Good butter is needed and will readily sell for a high price in all our cities. We are opening up another market for cheese by furnishing the kind that will keep well on long voyages and in hot climates, and of the precise character demanded by the people of those climates.

Factories of this kind should be put in operation in every county, at least a half dozen or more, in order to supply the home demand for good butter. The plan works well in Orange county, where there are already established some fifteen factories, and we are satisfied, after thoroughly looking over the ground in both districts, that with proper care and attention, as good butter can be made in the central counties as elsewhere.

SPRING MANAGEMENT OF DAIRY STOCK.

Cows that are about to "come in" should not be exposed to cold winds and storms. Such treatment is a fruitful source of trouble, and a good deal of what is termed "bad luck" with cows results from neglect and improper treatment of stock at this season. Many persons are accustomed to turn the herds from the stables in the morning and keep them out until evening. The weather in March and April is variable—it may be warm and pleasant in the early part of the day, changing by noon to storms of rain or sleet—and it is these storms, when cows are near the period of calving, that do the mischief. Cows also that are "in" are extremely sensitive to cold, and are often very much injured by sudden exposures to wet and cold. We recently conversed with a dairyman of large experience, who, the present season, has had four or five cases of cows affected with serious trouble on account of their having been left out by chance in a storm just before their period of calving, and he gave it as his opinion, founded on years of observation and experience, that many of the diseases incident to stock in the spring could be traced to this cause. Many persons seem to forget that beasts, like persons, are liable to be affected by changes of temperature and exposures. Cattle that leave a warm stable feel these changes more sensibly than those that are left to rough it from day to day through the winter and are never housed. They take cold and fall sick, and are straightway pronounced to have the horn-ail or some other distemper, the cause of which is not known, when if the facts were properly brought out, it would be

found to be the result of exposures or neglect on the part of those who have the care of stock. We have alluded heretofore, in our articles published in the Transactions, to the practice, becoming of late quite common in the dairy region, of allowing cows to calve in the stanchions. It appears to be unnatural, to say the least, if not cruel, and yet from the almost universal testimony of those having had long experience in the care of stock, it is regarded as the safest course to be pursued. We should always prefer, however, when practicable, to let the animal have a roomy stable by herself as more conducive to quietness, and as the more natural and humane treatment at this critical period. There are conflicting opinions among good dairymen in regard to the treatment of cows after calving—some preferring a low or moderate diet, at most nothing more than good hay, with free access to the usual watering place and an avoidance of all warm drinks.

The arguments in favor of this course for the first few days after parturition are, that it is better calculated to allay fever, and sooner brings the cow round to a healthy condition. On the other hand, it is urged that the animal during labor becomes more or less exhausted, and that, if the weather is cold, the taking of considerable quantities of cold water to slake thirst, has a tendency to chill the animal and impede circulation, and hence, a gruel made of bran or oaten meal, and tepid water, can be given soon after calving with the best results. The latter course has been our practice, and uniformly with success. After the lapse of several hours the cow is allowed to drink as usual. It is perhaps unnecessary to say that stock at this season of the year should be entrusted only to careful hands; they demand almost constant oversight and attention. They should not be hurried in or out of the stables, or allowed to fight or worry each other about the water trough or in the yard. Accidents, of course, will occasionally occur, under the most careful treatment, but by the adoption of a uniform system of kindness to all neat stock, with a reasonable share of attention, there need be little, if any, "bad luck" to be anticipated.

One thing we regard as imperatively demanded for success in the management of stock. Never allow a cow to be kicked or struck, or in any way abused by hired help. Whatever good qualities a man may have, better part with him at once if found disobeying orders in this respect. State the case plainly at the time of hiring, and make as a condition the forfeiture of a part or the whole of the man's wages who is found guilty of kicking or beating

cows. The practice has become common and should be broken up. The annual losses from this source are immense. If every dairyman would make it a rule that his milch cows *must* be treated kindly, and that no excuse can be taken for blows and kicks, and that no person would be employed who maltreats stock, the whole country would be greatly benefited. We have known of valuable animals being lost by a kick, and others rendered valueless for the season by an apparently slight thump with a milking stool, from bad tempered persons. Laborers of this kind are dangerous, and the sooner one is rid of them the better. Much can be effected in this matter by good example, for if the owner himself so far forgets himself as to abuse stock, he cannot expect the men in his employ to do otherwise. When the business of the year is about to commence, the start should be made with sound, healthy and vigorous stock, and from such reasonable results may be anticipated.

RAISING STOCK.

It is generally conceded, we believe, that it costs our dairymen more to raise than to purchase stock, that is, that a heifer or cow of a given weight, milking qualities not being taken into account, can be purchased from the droves or picked up here and there through the country at considerably cheaper rates than an animal of the same weight can be raised on the farm. This fact has led astray whole sections of the dairy district.

The annual loss or depreciation of the herds is made up by importations, and as a consequence no improvement is effected in the milking qualities of the herd. A dozen years ago it was less difficult to purchase good cows than now. As dairying has become extended, there is more reluctance to part with the best milkers throughout the sections where the droves are picked up, and as a consequence the animals got together are for the most part second rate, having been turned off for some fault. So unsatisfactory has this practice become of filling up the herds with culls, that it is universally deprecated by our best dairymen, and yet a large number of those who are fully satisfied that the practice is bad and unprofitable, still continue to purchase instead of raising their stock.

We have seen animals purchased from droves at prices ranging from \$40 to \$60, that but little more than paid for their summer keep, and were turned off in the fall for barrellers at from \$12 to \$15. One of the causes operating against the raising of stock is

the cost and trouble of keeping the calves up to the time of weaning. When cheese is high, many farmers think they cannot afford to use the milk for any other purpose than converting it into butter and cheese; and hence the young calves are slaughtered from time to time, and the season passes away without any effort to improve the future condition of the herd by breeding. There has never been a greater necessity for improved dairy stock than at the present time. The increased rates of taxation and the expenses for carrying on the business of dairying are so much greater than they were a few years ago, that it would seem an imperative necessity existed for providing larger returns in this way to meet the exigencies of the times.

Every dairy farmer should strive, now, to bring up his herd to the annual production of 700 pounds of cheese per cow. That point has been reached in many instances, but in order to do it resort must be had to judicious breeding and raising stock on the farm, and the abandonment of the practice of filling up the herds annually with culls. There are few herds but can boast of at least a few extra cows for milk, and stock from these should be selected and raised. It is true, the best results are to be obtained by breeding from a cross of a thorough-bred of good milking family on our common or native cows, but excellent milkers are obtained by raising stock from extra milkers of any breed. We have seen families of the so-called natives that rarely failed in bringing superior milkers, and that, too, when no attention had been given to breeding. The progeny of such stock should be raised, and the man who neglects to raise the heifer calves of these cows commits a great wrong.

There are various opinions in reference to the best and cheapest manner of raising calves. We believe the best results are obtained by giving the calf generous treatment from first to last. A poor, stunted and half-starved calf will never be able to reach that standard of excellence that it would had a more liberal allowance of food been made during its earlier days. If a calf gets a fair start on milk, its food may be changed to whey by adding a porridge of oat meal, oil cake, or buckwheat flour to supply the necessary constituents lacking in the whey. We have frequently heard good success resulting from a feed of the liquor from steeped hay, to be used with a small quantity of milk, or as an addition to the daily allowance of whey. Where conveniences are had for steeping the hay, it may prove an economical food, and yet we should prefer

the porridge of oat meal, oil cake, or buckwheat flour, as requiring less labor in its preparation and easier to be regulated as to the quantity required. Almost every farmer has some peculiar notions in regard to the manner of raising calves; but the great and general fault in management is a scanty allowance of nutritious food. When cheese is worth 20 cents per pound and butter 50 cents, milk is valuable it is true, but in stock raising the same principle must be observed as in raising crops. It pays well to do the work thoroughly, and in the best manner at first, and no after treatment will be able to wholly counteract neglect or starvation in the early stages of growth, whether of plants or animals.

The importance of growing good dairy stock cannot be too strongly urged upon the dairy farmers of the State. The time is not far distant when it will be impossible to run a dairy farm on high priced lands with stock averaging only 350 to 400 pounds of cheese per cow, and make a living profit. The system of annually importing worthless stock must be abandoned. It has already been too long in vogue, and those who take measures now to provide against the future in this matter will act wisely. Central New York should be as noted for its improved breed of dairy cows as it is for its dairy products. The end can be reached by determination and persistent effort on the part of our farmers. In looking too closely for immediate returns, we have been drifting farther and farther from our true and best interests. A poor cow should be disposed of at the earliest possible moment. If her place cannot be filled with an animal capable of yielding some profit, let the land be turned to some other account.

We hope this question of raising stock may be duly considered and receive the attention it deserves, believing that those who commence now with the determination of securing an improved herd will find their account in it, and will have no cause for regret in the future.

GROWING CORN FODDER FOR GREEN SOILING MILCH COWS.

Much has been said recently about the best breeds of cattle for the dairy. Good dairymen are becoming more and more impressed with the importance of getting together a herd of cows that will produce a large quantity of milk, and in purchasing are not disposed to higgie at prices if quality can be obtained. Of course there is a vast difference in the capacity of different cows to give milk, but the production of milk does not depend altogether on

careful breeding and a selected herd. The question of good and abundant food is no less important than good cows. An abundance of milk depends upon an abundance of food. Barren pastures and half-starved animals will not yield much milk, however good the breed, or great the capacity of the cows for producing it. It is a great mistake to overstock pastures, and yet it is largely practised throughout the dairy districts. We have seen dairymen fill up their herds in the spring with high priced animals, thereby reducing the amount of cheese turned off for the season below what it would have been had not an animal been added to the herd. They were anxious to have no food go to waste, and in the effort to economize in this respect lost sight of the fact that by overstocking the whole herd was compelled to economize also in the yield of milk. The actual requirements of the animal must first be attended to. Life must be supported, and the waste of the system constantly going on is to be made up. These always stand first, and after that the cow is willing to convert surplus food into milk. But even when pastures are not overstocked, feed begins to depreciate in quality during the latter part of summer, and unless some provision has been made to supply the herd with additional food the yield of milk also, as a consequence falls off. Experienced dairymen understand the fact that when the flow of milk has been checked for any considerable length of time by reason of depreciation in food it is difficult to get the cows back again to the old standard. Hence soiling is resorted to for the purpose of keeping up the habit until the time for turning into the afterfeed. Corn sowed broadcast or in drills is admirably adapted for producing the requisite food for summer soiling milch cows. It is nutritious and succulent, and promotes a flow of milk, if not quite equal at least second only to clover. It is a profitable crop to raise, because an immense quantity can be grown per acre. There need be no loss in growing the crop, since if any part is not wanted for soiling, it may be cut and cured and used for winter.

No one who keeps a dairy should neglect to grow a patch of sowed corn to meet the probable wants of his herd during the latter part of August and September. If the season proves to be dry, his stock will need it, and by this means he will be able to keep his cows in condition and obtain full returns, while those who have made no provision for extra food must suffer a considerable loss. During the season of 1864, in some sections, stock could not have been carried through had it not been for patches of sowed corn

which came in play about the time that pastures began to fail. Many who did not put in this crop were forced to feed from meadows, and as a consequence were cut short of winter fodder and obliged to reduce their herds in the fall. Sowed corn may be put in from the first to the fifteenth of June. The land should be heavily manured and put in good tilth. Old land that has not been fall-plowed should be plowed twice, and the manure thoroughly mingled in the soil. The usual practice is to sow broadcast and harrow in the seed; but we prefer drilling in the seed with a machine, making the rows about two feet apart. This will admit of running a cultivator or horse hoe between the rows, which keeps down the weeds and stirs the soil, giving a better crop. The Western or Dent corn, gives the largest amount of fodder. Some use three and others four bushels of seed per acre when sowed broadcast. When sod ground is to be employed for sowing the crop it pays well to subsoil. We have grown immense crops by manuring on the sod, turning under, and subsoiling the land. In curing the crop for winter fodder we cut, tie in bundles and shock up. This is the safest course, since if the weather is bad there will be difficulty in curing if left spread out on the ground to dry. There is an occasional season, it is true, when, with an abundance of rain that keeps grass fresh and in vigorous growth, corn for soiling purposes is not needed. But such seasons are the exceptions, and it is poor economy to base operations upon chance. It will be better to make proper provision for stock since if it happens not to be needed, the crop is not lost, but will pay largely as winter fodder. The extent of ground needed for growing fodder will depend of course upon the manner in which the crop is put in and cultivated, as well as the season. It should not be less than an acre for every ten cows, and it will be no bad management if a larger area than the proportion named be cultivated.

OBSERVATIONS ON PARASITES AND PARASITIC DISEASES AS AFFECTING DOMESTICATED ANIMALS.*

BY JAMES BEART SIMONS.

[From Journal of Royal Agricultural Society, England.]

Investigations of the lower forms of animal life are among those which most interest and instruct the student of Natural History; but when they have for their more immediate object an elucidation of the causes of disease they acquire an importance not otherwise belonging to them.

The study of those creatures known as parasitic has of late years been rewarded by most unexpected discoveries, and we are now enabled to understand much of that which before was mysterious and hidden. Nor is this all, for to a great extent, also, we have been furnished with the means of preventing many of the diseases which are known to be connected with the presence of parasites both in man and animals. Each diligent investigator has in turn contributed something to our former knowledge, but yet much remains to be done. A rich harvest still awaits him who labors in this field of Science.

In the following pages we purpose to speak of the parasites affecting domestic animals in particular; to describe their structure and habits, and to deal practically with the means of either affecting their removal from the bodies of their hosts, or of counteracting their morbid influences. It may be truly said that no part of the organism is exempt from their indwelling, and that to reach their habitat many of them undergo strange migrations, and still stranger transformations, the particulars of which will, however, best appear as each creature is passed in review.

Parasites are usually divided into three classes: those which infest the skin in particular, and being *upon* an animal have hence been termed *Epizoa*; those which occupy for a given time only,

* Our inability to reproduce the illustrations which accompany Prof. Simons' article as originally published is much regretted, as they would assist greatly in identifying the several species treated of.—S. L. G.

while undergoing a metamorphosis, either the external, or some internal part of the body with which there is a direct communication—the *Ectozoa*; and those which inhabit the internal organs and are met with at times in every tissue of the frame—the *Entozoa*. In our description we purpose to deal with the different individuals belonging to these several classes in the order in which they have been named.

EPIZOA.

Pulex.—THE FLEA.

The flea is too well known to require a special description either of its structure or form. It is a creature remarkable for its agility and strength, being capable, according to computation, of leaping fully two hundred times its own length, and of moving a weight which many times exceeds that of its body.

Fleas infest various mammals and also birds, but are rarely met with on any domesticated animal, excepting the pig, the dog, and the cat. Poultry and pigeons are likewise subject to fleas, and occasionally they are present in very large numbers in old straw or thatch, and are thus brought into the cattle sheds and pig cotes of the farm, or even into the house itself. In a case which came under our notice some years since, we were enabled to trace their presence to the erection of some pigsties with building materials, and the thatching of them with *old straw*. They were erected in a meadow near to the premises, and proved to be so infested with fleas that the proprietor at last wisely determined not only on pulling them down, but on setting fire to the whole of the materials. By these means alone he succeeded in freeing his dwelling house, and also that of a neighbor, from these troublesome parasites.

Besides instances of this kind, it has not unfrequently happened that extraordinary visitations of fleas have taken place in particular districts, the origin of which could not be traced. We were recently informed of such a case; too late, however, even for an examination of specimens to determine the variety to which the fleas belonged. The visitation assumed such proportions that not only the yards and buildings, but the adjacent fields also, swarmed with these troublesome insects. After remaining for three or four weeks, to the great discomfort of the family as well as of the animals on the farm, they gradually disappeared, without any means for their eradication having been adopted.

Naturalists place the flea in the order *Diptera*, sub-order *Aphan-*

iptera—sheath-winged and hopping diptera—and family *Pulicida*, of which it constitutes the only genus, although the varieties are numerous, amounting, according to some authors, to as many as twenty-five. The insect undergoes a complete metamorphosis, analogous in every respect to that of moths or butterflies. The female flea of man, *Pulex irritans*, is said to lay about a dozen eggs at a time, which are ovoid in form and comparatively large, bearing a strong resemblance in these particulars to the egg of the dog flea. At first the eggs are of a whitish color, but they soon acquire a dark hue.

The egg of the dog flea, which may be taken as a type of the class, gives birth after a very short period to a larva, which is long and slender, somewhat resembling a worm in its form, and differing in no essential particular from the larva of the *Pulex irritans*. The larva consists of fourteen segments, including the head. These gradually increase in size towards the caudal extremity of the creature, reaching their fullest dimensions at about the tenth segment, from which they again diminish. Although the larva is not furnished with legs, it is nevertheless remarkably active in its movements, which are crawling or worm-like. The head is surmounted by two very small antennæ. The mandibles are well developed, but their precise arrangement does not admit of being clearly defined. No eyes can be detected. Each segment below the head is beset with a few stiff hairs, the number and size of which also increase towards the caudal end of the larva. On the edge of the last segment but one the hairs are so long and thickly set as to form a kind of fringe, which often projects beyond the hooklets that are here developed. A similar arrangement of them is also to be observed, but in a less degree, upon the last four or five segments. Besides this peculiarity, the extreme end of the last segment is furnished with a tuft of a very fine hair, and it gives origin also to the two small hooklets previously alluded to.

It is thought by some naturalists that the larva of each variety of flea, besides inhabiting the skin of the animal to which it especially belongs, often travels to other mammals or birds, obtaining from them a supply of food suited to its rapid growth and development. According to Rymer Jones, the larva of the *Pulex irritans* attains its full size in about twelve days subsequently to quitting the egg, when it forms for itself a small cocoon, after the manner of the silkworm, and changes into a pupa. Whatever the fact may be with reference to the larva of this flea, we can take upon

ourselves to say that the larva of the *Pulex canis* often lives double this time before the change is effected. The period which elapses before the *imago* bursts forth is said by Newman and others to range from eleven to sixteen days, a statement which our observations tend to confirm.

The Pulex Canis.—Firstly, it is necessary to remark, that as the form of the flea is modified in each individual animal whose body it inhabits, the flea of the dog can be easily distinguished from any other by a microscopical examination. The chief points of difference between it and the *Pulex irritans* consist in the lower part of its head, and the upper and lateral parts of its prothorax being provided with a comb-like fringe. The use of this is not very apparent, but probably by the pectinate edge of the prothorax the creature is enabled to keep a firmer hold of the hairs when travelling over the body of the dog, while by that of the lower part of the head it can the more easily push aside the downy hairs so as to insert its lancets and suckorial organ into the skin to obtain its food. When located on the body, even in small numbers, dog fleas cause considerable and persistent irritation, but do not give rise to any special form of eruption, although the dog will occasionally rub himself quite bare in places in his attempts to rid himself of their presence.

All the metamorphoses which the creature passes through are frequently completed on the skin of the dog, and hence many dogs suffer considerably from fleas for months together. A remarkable instance of this kind was brought under our notice a few years since by Mr. Austin, M. R. C. V. S., of Exeter, in which a dog had been for six months the subject of excessive cutaneous irritation. The case will be found recorded at page 335 of "The Veterinarian" for 1855.

Mr. Austin stated in his communication that although the itching had existed so long, and was always very considerable, still, when the animal was brought under his care, no eruption was to be observed. On making a close examination, however, he says: "I discovered a number of little animals, unlike any I had ever seen before, upon nearly every part of the dog's body. I succeeded in getting some of these alive, mixed, however, with much dirt and scales of cuticle. I send them by a friend, and hope they will reach you before they are dead or dried up."

In commenting on this case, in the journal alluded to, we observed, "that more than a month had elapsed before the small jar

containing the parasites came to hand, and, consequently, we despaired of finding any of them alive. To our surprise, however, we found three or four still living among the mass of dirt and cuticle. A slight examination was sufficient to show that these were the *larvæ* of some insect, and the microscope at once decided that they were the *larvæ* of the dog flea. Further search showed that there were numerous dead *larvæ* and *excuviae* present, and, therefore, to facilitate our future examination, the whole mass was placed in a phial with some diluted spirit, that the organisms might be freed from the dirt and be the more readily selected after the imbibition of the fluid. By this means we obtained specimens which rendered the history of the dog flea perfect and complete. Thus we have in our possession *ova*, showing, more or less perfectly, the formation of *larvæ* within them; *ova-cases* from which the *larvæ* had escaped; *larvæ* in different stages of growth; *excuviae*, as cast off from time to time from the growing *larvæ*; *pupæ* in their various stages of change into the perfect insect; and *insects* themselves just brought into active life."

This extract, in addition to our other remarks, so fully explains everything connected with the habitat and effects of the dog flea, that we may proceed to speak of the means at our command to rid the animal of this troublesome parasite.

Blain, in his *Canine Pathology*, thus writes:—"Washing the body well with soap suds and directly afterwards combing it with a small-toothed comb are the most ready means of dislodging these nimble gentry. But it must be remembered that the previous washing is only to enable the comb more readily to overtake them. The water does not destroy them, for dogs that swim every day are still found to have fleas. The insects are very tenacious of life, and soon recover this temporary drowning; the comb, therefore, is principally to be depended on for their capture before they recover. But as washing is not, in many instances, a salutary practice, and as, in many others, it is a very inconvenient one, so it becomes a matter worthy of consideration how to be enabled to destroy them without these means.

"Sopping the skin with tobacco water has been recommended, but it has only a momentary effect, and it not unfrequently poisons the dog. Innumerable other means I have tried to *drive away* fleas, but the only tolerably certain one I have discovered is to make dogs sleep on fresh yellow deal shavings. These shavings may be made so fine as to be as soft as a feather bed, and, if

changed every week or fortnight, they make the most cleanly and wholesome one that a dog can rest on, and the turpentine in them is very obnoxious to the fleas. But where it is absolutely impracticable to employ deal shavings, it will be found useful to rub or dredge the dog's hide once or twice a week with very finely powdered resin ; if simply rubbed in, add some bran."

Besides the means recommended by Blain, our experience in the use of a watery solution of the sulphide of potassium in the destruction of fleas and their larvæ, warrants us in strongly recommending this agent. Let the dog be sponged over with the solution, *freshly* made by adding two ounces of the sulphide to a pint of water. The whole body should be covered at a time, and the sponging be repeated two or three days in succession, after which the skin should be thoroughly cleansed with soap and water.

It should be remembered, however, that where dogs are sleeping in kennels out of doors, the most effectual means of ridding them of fleas will often fail for want of a complete cleansing of the kennels. These should not only be well washed, but thoroughly purified with lime water, and it may even be necessary to do this two or three times in succession. The same care should be taken also to cleanse all sleeping places and everything contiguous to them, where these parasites, either in their perfect form or in one or other of their metamorphoses, are likely to exist. Similar means are to be employed in ridding pigs and pig cotes of fleas, and especially should all the old litter be destroyed.

Pulex Penetrans.—THE SAND-FLEA, CHIGGER, CHIQUE, CHIQUE, &c.

Another of the family of *Pulicidæ* is the *Pulex penetrans*, a variety from which this country is fortunately exempt. It has been said, however, to exist in the feet of sheep, and to be the means by which "foot-rot" extends in a flock, even in this country. The late Mr. Youatt, who was himself a believer in the contagiousness of this disease, thus writes : "Some persons have imagined that foot-rot is propagated by means of animalculæ which are bred in the virus of the part, and falling on the pasture attack the feet of other sheep. They have gone so far as to describe this insect, and to give it a name—the *Pulex penetrans*. The author of this work has often sought for it in vain ; and the sources of contagion are numerous and satisfactory enough without any gratuitous supposition of the kind."

With the question of foot-rot being viewed as a contagious disease we have not now to do ; nevertheless we ought not to allow this opportunity to pass without stating that we are no converts to such a doctrine, knowing full well that the spread of the disorder in a flock depends entirely upon common causes.

Dr. Stephenson, in his "Medical Zoölogy," thus speaks of the *Pulex penetrans*: "One of the most troublesome and noxious insects of the low regions of South America and the West India Islands is the Ohégoe, a small species of flea, with a rostrum as long as the body, which often introduces itself into the skin of the inhabitants, usually under the nails of the toes, where it deposits its eggs, and produces malignant and occasionally fatal ulcers. It is a very minute insect, being one-fourth the size of the common flea, pale reddish brown, semi-transparent or shining, with the legs of a pale blueish or lead color. According to Ulloa, and his opinion is confirmed by Jussieu, there are two South American species of this insect. It is described as generally attacking the feet and legs ; but, according to Capt. Hancock, it will penetrate any exposed part of the body. At first it occasions no farther uneasiness than a slight itching and heat ; in process of time, however, a small bladder or membranous sac is formed, containing the nits or ova, which speedily multiply to such a degree as to be attended by the most fatal consequences, rendering amputation necessary, and sometimes causing death."

In Kücheumeister's work on animal parasites, it is stated that, "according to most authors, the *Pulex penetrans* only lives as far as 29° of south latitude in the hot countries of South America, especially in Brazil ; whilst Gondot found it even in the cold region of New Granada as far as Bogota. According to the journals of Count Gortz, besides sand, the flea likes to dwell in the crevices and joints of pigsties." Again, "Martiny gives the following notes upon it from Dobritzhofer : This animal is so small that it can only be seen by sharp eyes with a good light, for which reason the seeking for the flea after its immigration is generally left to children. It perforates the skin down to the flesh, and concealed in its tittle canal swells up into a white, globular vesicle, which in a few days may become as large as a pea, the pain constantly increasing ; this is the abdomen of the female filled with eggs, or, more correctly, with larvæ. Neglect of the disorder or careless rupture of the vesicle, that is, the abdomen, by which the young are scattered in the wound, where they mine fresh passages,

leads to bad sores, to inflammation of the glands of the groin, to mortification, and, in consequence, to amputation or mutilation of the limbs, or even to death. The toes are especially attacked by the flea, although other parts of the body are also visited."

Alluding to the treatment of cases of this kind, Kùcheumeister says, "when the animal has once made an entrance, the orifice of the canal, which is marked by a red point, may be sought, the passage widened with a needle, and the flea drawn out, but without tearing it. With fresh punctures it is best to wait a day, until the occurrence of the white vesicle, that is to say, the swelling of the abdomen with the brood, allows the animal to be more readily detected. Here also I should think that touching this vesicle with oil of anise would be beneficial and kill the flea (because the respiratory stigmata are situated upon the abdomen) or compel it to wander out. The cavity remaining after extraction is treated like a simple wound. In Brazil they fill it with oil, snuff or ashes."

Ixodes Ricinus.—THE TICK.

The tick is a true blood sucking parasite, belonging to the family *Ixodida*, the class *Arachnida*, and order *Acarina*. The species or varieties are very numerous, both here and in most other countries.

Although ticks are met with upon every variety of domesticated animal, as well as upon several wild ones, still the *Ixodes ricinus*, dog tick, the *Ixodes reduvius* and the *Ixodes plumebeus*—sheep and cattle ticks—are best known in this country.

These parasites exist in most localities, but they especially abound in light, sandy and warm districts, where brushwood, thickets and plantations prevail! In such situations they remain secure from injury, and comparatively at rest during the intervals which elapse between the times of their obtaining a full supply of blood from the animals they attack. Prompted by hunger, however, the tick becomes more active, and will then fasten itself upon almost any animal which may come in its way. To effect this it plunges its rostrum—sucking proboscis—deeply into the skin, and thus fixed it will hang on for days together sucking the blood, until its body becomes distended to eight or ten times the original size. When filled to repletion it quits its hold, and again seeks the security of its hiding places.

It is by no means an unfrequent occurrence for horses in such localities, while at exercise at early morn in summer, to be attacked

by ticks, and consequently to return to the stable with several of the parasites upon their legs. Besides animals, ticks will frequently attack birds, and they have been also known to occasionally fix themselves on man to obtain a supply of blood. It is, however, only in very rare instances, and these chiefly in dogs, that ticks exist in sufficient numbers to give rise to much irritation or suffering. Dogs taken out for sporting will often return with a large number of them fixed to their skin. This especially is the case with dogs used for rabbit catching in the autumnal period of the year, more particularly when warm weather prevails. Ferrets, also, which are employed to drive the rabbits from their burrows, will be attacked in a similar manner. Rabbits when killed are frequently found to have several of the parasites upon them; and so also, but more rarely, are hares. Not only is this the case, but weasels and stoats are so generally affected with ticks, most of which are so small and young, that some persons have supposed that the parasites are originally bred upon these and similar wild carnivora by the parent tick depositing its ova on different parts of their bodies. It is a somewhat singular circumstance that ticks, which do not seem as a rule to show any preference for one part of the body over another, are said to congregate inside the ears and between the toes of weasels and stoats. It is supposed by some that these places are selected by the young ticks, as the animal cannot easily dislodge them from thence; while by others it is thought that the ova of the parent tick were deposited in these sites.

A few years since we met with a large number of young ticks adhering to the head and face of a horse sent to the college for examination as to soundness. The animal had been forwarded from the country to a gentleman in town a few days before, and the parasites had not been detected until seen by ourselves, probably in consequence of their small size and brown hue, which pretty nearly approached the color of the horse. We were enabled to obtain many specimens with their rostrum—sucking proboscis—entire, always a difficult thing to effect, in consequence of the peculiarity of its formation, and its firm insertion in the skin.

The chief points of interest in the structure of the tick are as follows: The barbed or serrated rostrum, by means of which, as the barbs point backwards, the parasite is enabled, almost without muscular effort, to retain its hold of the skin, is clearly depicted. The externally barbed rostrum is found to sheathe the mandibles,

two in number. These are three-jointed, "the basil joint being internal, the second external and long, and the third short and denticulate."

The palpi, situated close to the rostrum, one on either side, are broad and large, and in some specimens would seem from their near approximation to the rostrum, to be capable of embracing it. The abdomen, or body of the parasite, is formed of an exceedingly extensile membrane, whereby the creature is enabled to receive, without inconvenience, a large quantity of blood into its digestive system, to be husbanded for its future wants. The legs are eight in number, and are attached to the under part of the body at its anterior half, having their places of attachment very near each other. They are of nearly equal size and length, and are furnished with seven joints. At their free extremities they are tipped with two recurved hooks, having a fan-like expansion of membrane between them. On the back of the creature, immediately behind the palpi, a cuticular shield-like plate, much darker in color than the rest of the skin, is placed evidently to give strength to this part of the frame. On the under surface of the abdomen, just behind the last pair of legs, a circular shaped respiratory organ exists on either side; and a little farther backwards a similarly shaped body centrally placed, having a slit in its middle, is also present. The latter named opening is the excretory outlet to both the digestive and reproductive systems.

Although, as has been stated, these parasites are comparatively harmless in this country, still, in many parts of South America, they attack animals in such great numbers as to give rise to serious consequences, and often, indeed, to cause death. At a meeting of the Microscopical Society, in 1842, Professor Busk exhibited some *living* ticks which had been sent him from Rio Janeiro, as specimens of the parasite, called by the Brazilians the *carapato*, which had been from sixty to seventy days on their passage. At a subsequent meeting of the same society, Mr. Busk read an interesting paper, containing much practical information on the subject, from which we make the following extracts:

"1. The name of *Carpato* or *Carapat* is given to the insect in consequence of its resemblance to the seed of the *Ricinus*, which has that name in Portuguese.

"2. It is common in all parts of South America where cattle abound.

"3. It infests cattle, horses, dogs and sheep.

"4. It is not found on plants; and cattle generally become infested with it when feeding in open and exposed pastures, where the sun's heat is great, and it increases most in dry seasons. It is generally supposed that the insect was not seen in the Brasils previously to an excessively hot and dry summer, about 1824 or 1825, since which it has

multiplied amazingly. It is remarkable that cattle feeding in shady pastures and cop-pices are frequently quite free from the carpatos, but will acquire it by infection from others.

"5. The mode in which it appears to cause destruction to the animal infested by it, is by the incessant irritation which prevents the animal feeding or resting, and, in consequence, it becomes worn out.

"6. They first appear on those parts of the skin uncovered by hair, and are then not larger than a pin's head, but make the part quick black by their numbers. They adhere so closely that scraping them off would tear up the skin. In a short time they increase to the size of a bean, or common tick, as seen in dogs, and fix themselves promiscuously on all parts of the hide where covered with hair.

"7. The same species appears to insinuate itself, in its incipient state, upon the human body, but is not known to assume the tick form there. They adhere tenaciously to the skin, and are believed to introduce themselves below it. They are very harassing, and even create soreness and inflammation. They generally affect persons who have been passing through woods, but are not known to be ever seen or found on trees or plants.

"8. Many thousand head of cattle are annually carried off by the carpatos, and frequently a scarcity is thus caused."

The means at our disposal for getting rid of ticks are simple and efficacious. They should not, however, be pulled off, unless existing in twos or threes, for by such means the rostrum will be left fixed in the skin, and may give rise to untoward results. Mr. Blain, in his "Canine Pathology," recommends that the parasites be clipped asunder with a pair of scissors, when they will, he says, immediately retract their sucking organ and fall off.

Sponging the skin with a decoction of tobacco, saturated with salt, will generally cause them to quit their hold. A mixture also of linseed oil and creosote, made with one ounce of the latter to four of the former, rubbed in with the point of the finger around the part where the ticks are placed, will be effectual for their removal.

They are likewise very easily destroyed by touching them with oil of turpentine, but it generally happens that they still retain their hold; this, however, is a matter of little importance, because after death they can readily be detached by the slightest friction, and will then be found to come away entire.

Melophagus Ovinus.—SHEEP TICK.

Although commonly called a tick, this well known parasite belongs to a very different order of insects. Its natural history is so replete with interest, that it may be affirmed the scientific investigator feels an ardor in his researches which is only surpassed by the desire of the practical agriculturist to rid his flock of this troublesome visitor.

The natural history and mode of development of the *Melophagus* agree with those of the *Hippoboscites*, a variety of the *Diptera*, although, like many other genera, the *Melophagus* is entirely devoid of wings. Its metamorphosis is perfect, but not completed in the same visible and well understood manner as in most insects which undergo this change. Thus the *larva* is produced from the ovum *within the body of the parent*, and changed likewise into the *pupa* before being expelled from her uterus. Insects undergoing a metamorphosis of this kind are termed *pupiparous*, in contradistinction to *oviparous* and *viviparous* creatures, as well as to those which pass through an ordinary series of metamorphosis.

A single ovum at a time is transformed in the manner described, so that melophagi multiply only by a series of single births. When first expelled, the pupa is of a yellowish color and easily compressible, but it soon acquires a brown hue and considerable hardness. It adheres to the wool very slightly, and principally by the sebaceous secretion of the skin of the sheep. A magnified view of a pupa shows that in its general form it is egg-shaped, having, however, one of its ends truncated.

The sides of the pupa are somewhat flattened, and are marked with twelve distinct depressions, arranged in two parallel lines. Occasionally these depressions are more strongly developed on one side of the pupa than on the other. They are described as being connected with minute apertures for the transmission of air to the growing embryo; but we have never been able to satisfy ourselves by an examination of the pupa cases, either before or after the escape of the young melophagi, that they had any such connection, or indeed that there is any opening whatever. From the central part of the truncated extremity of the pupa a small projection rises which has a well developed spiracle on each side of it. These opening would appear to be the chief if not the only means by which air can reach the embryo.

In an early stage of the development of the pupa, a similar projection is to be noticed at the rounded extremity, giving attachment to a slight membranous thread—the umbilical cord—by means of which the pupa is connected to the oviduct. In some pupæ this projection remains long after their expulsion by the parent, but it rarely persists for so long a time as the one at the opposite end. The young melophagus when perfected makes its escape at the rounded extremity of the pupa case by raising it as an operculum at the place marked by a line in the figure.

The time which is occupied in maturing a pupa within the body of the parent seems not to have been ascertained; but seeing the rapidity with which melophagi increase during the summer months, we conjecture that it cannot be very long. Repeated experiments enable us to express our belief that about fourteen days elapse between the birth of the pupa and the perfecting and escape of the young melophagus from it. We cannot, however, speak with absolute certainty upon this point, in consequence of the difficulties in the way of its correct solution. It seems to be necessary for the development of the embryo that the pupa be kept not only warm, but protected to a considerable extent from the drying effects of the air, conditions which are provided for by its lying near the roots of the wool, and being smeared over with the sebaceous secretion of the skin of the sheep. Where pupæ are removed from the wool for experimental purposes, and kept at about the same natural temperature, the nearly perfected embryos will often make their escape in four or five days. After this time, under ordinary circumstances, the embryos mostly die, so that the shepherd has it in his power to destroy many melophagi by simply picking off the pupæ and casting them away, as well as by crushing them with his fingers.

The best account of the structural peculiarities of the melophagus we have yet seen is from the pen of Mr. L. Lane Clarke, in the January number, 1864, of "The Intellectual Observer." It enters, however, into many details of little interest to the general reader, and therefore we content ourselves by reproducing a shorter description of the parasite from the pages of the "Micrographic Dictionary:"

"Melophagus Ovis—antennæ small, sunk in an eye-like cavity of the head; eyes small, oval, resembling two groups of ocelli; setæ three, enclosed in two sheath-like, hairy, unjointed organs (labial palpi), resembling otherwise those of pulex, and arising from the sides of a triangular labium. Legs robust; tarsi with two stout serrated claws, each having at its base a blunt process; accompanying the claws is an elegant feathery tarsal brush, and on the under side of the last tarsal joint is a bilobed pectinate organ."

Melophagi inconvenience sheep considerably; but we have never observed any special disease of the skin to be produced by them. It is, however, imperatively necessary they be got rid of, not only for the comfort of the animal, but for the saving of wool. During

the winter few "ticks" are to be seen, but on the approach of spring they begin to procreate with great rapidity, so that by shearing time many sheep, and especially hoggets, will often swarm with them. They are somewhat erratic in their habits, and will not only quickly travel from sheep to sheep, but likewise on to shepherds and others who have the handling of the animals. They, however, are never found to inflict any injury on such persons, but merely to produce a good deal of tickling of the skin over which they roam. Their instinct often leads them to seek a hiding place among the hairs of the head, but even here they do not rest very long, not finding their proper habitat.

"Dipping" of sheep is the only effectual means of destroying these parasites, and the earlier in the spring, weather permitting, hoggets are dipped the better. By this means the destruction of a numerous progeny by the death of the parent melophagi obtained both for the comfort of the animal and the interest of the flock master. Not only are "ticks" and many pupæ thus got rid of, but also lice and acari, the latter of which are the immediate cause of the disease known as scab. Various mixtures, more or less destructive to parasites, are employed as baths for sheep, some of which can scarcely be used with safety. Before, however, we speak of these mixtures, we purpose to add some remarks on the louse of the sheep, a parasite by no means so well known as the "tick."

Trichodectes Ovis.—LOUSE OF THE SHEEP.

This parasite is common in some districts but very rare in others. Some very extensive flock masters seem, indeed, to be hardly aware of its existence, and in answer to our inquiries have said they had neither seen nor heard of it. It prevails chiefly where periodical dipping is not adopted, and hence it is often present in mountain sheep and also in sheep imported from Ireland. In many parts of the western counties of England the *Trichodectes* is by no means rare, and farmers in the habit of using sulphuretted oil, and similar agents, two or three times a year for its destruction. It is known in these districts as the red louse of the sheep; its head and thorax being of an iron color, and its body a pale yellow, marked with dark bands.

Denny, in his "*Anopluorum Britannicæ*," describes its chief characteristic to be "head, nearly orbicular; clypeus rugulose and ciliated, with stiff hairs; third joint of the antennae the longest and

clavate; * * * eyes very small; * * * prothorax subconical, truncate before and behind, nearly as wide as the head; metathorax transverse, the width of the head; * * * abdomen oblong; * * * legs fulvous, rather thick; tibiæ abruptly elevate and toothed; tarsi long; ungues nearly straight." He also adds, "the only specimen of the species which I have seen was forwarded by the Rev. L. Jenyns, who took it from a sheep."

We have been more fortunate in meeting with the *Trichodectes*, and have many specimens in our possession.

In some cases which have come under our observation these lice have been present in very large numbers. They appear to show a preference for the inner part of the thighs, and arms, and sides of the neck of the sheep. Their location in the latter situation often induces the animal to thrust its head between the bars of gates and horizontal rails to seek relief from the irritation by rubbing, a circumstance which occasionally has led to its becoming fixed and strangled. If the wool be broken, or short, and detached in places, and if the sheep nibbles its flanks and other parts of its body, and scratches its elbows with the hind feet, as in scab, an examination should be made, which will often be rewarded by a discovery of the parasites.

Sulphuretted oil will be found efficacious in destroying these lice, besides which the use of an agent of this kind during the winter months is more prudent, as sheep cannot now be safely dipped. *In lamb ewes* must also be freed from the parasites in the same manner. Some persons add an eighth, or even a sixth part of mercurial ointment to the oil, which is, however, objectionable when much of the surface of the body has to be dressed over. The increased efficacy of the mixture does not compensate for the risk which is incurred.

Many other agents might be named for the destruction of these lice, but it is not necessary to do so; the utility of sulphuretted oil being so well established.

SHEEP DIPPING.

The benefits arising from the dipping of sheep are universally admitted by flock owners, not only for the destruction of parasites, but for the general health and comfort of the animal, as also for its beneficial effect on the growth of wool.

Baths for sheep-dipping may be classed under four principal heads, viz: Vegetable decoctions, arsenical solutions, sulphur-

etted mixtures, and those, the anti-parasitic properties of which are chiefly due to alkaline carbolates in combination with tarry matters. Two, or sometimes more, of these compounds are however, not unfrequently mixed together, both by farmers and manufacturers.

Vegetable decoctions.—These preparations are multitudinous, and also variously combined. The principal agent, however, in most of them is tobacco, with which decoctions of some one or other of the following narcotic vegetables, as being the most active, are mixed in different proportions, viz: henbane, monkshood, figwort, hellebore, foxglove, stavesacre, &c. As a rule, vegetable decoctions are safe applications, if not too much concentrated, and they may consequently be used under circumstances unfavorable to the employment of arsenical solutions. Notwithstanding this, they are not in great request in England; but in Western Australia reliance is placed almost entirely on a decoction of tobacco mixed with sulphur, both for the destruction of ticks and lice, and also as a cure for scab—a disease which often causes immense losses in that country. The number of sheep to be dipped in Australia in a day, amounting frequently to several hundreds, calls for economy of time and labor, and hence various expedients quite foreign to us are necessarily had recourse to for getting over the work. The following extract from an article on sheep-dipping in that country by Mr. J. Aunaud, who had had considerable experience in the matter, is taken from the “*Veterinarian*,” for June, 1862.

“A bath is made which contains one pound of tobacco and one pound of sulphur to every five gallons of water, and into this the animals are plunged. The mixture is always kept as warm as the animals can bear it, avoiding of course extremes. Coppers are erected to boil the tobacco, after which the decoction is placed in a large dip or receptacle, and the sulphur is then added. These dips are constructed of various sizes and sunk in the ground. The heat of the mixture is kept up by the addition of hot liquor, and partly by the bodies of the sheep themselves. The dips should not be too large, as there is then a greater difficulty in keeping up the temperature of the fluid. If too small, however, there is a danger of the sheep striking on the bottom when precipitated into the receptacle from the pen above. A good size is that which will hold ten or a dozen sheep comfortably at one time.

“Having filled the bath, the first lot of sheep are sometimes thrown in one by one until it is full; but mostly they are precipitated from the pen situated above it by tipping the floor. Men are placed around the bath, who keep the sheep moving about, and occasionally, by means of crutches with which they are furnished, they push the heads of the sheep under the water. The sheep are thoroughly soaked in three or four minutes.

“The door communicating with the ‘run’ is then lifted up, and the sheep pushed through it into this passage. On the door being again let down the dip is ready for another lot. The sheep find their way from the ‘run’ into the draining-yards, which

are paved and slightly inclined. These yards being two, the upper one is first filled, and the gate then shut. The lower one is next filled, and when this is done the sheep in the upper yard are allowed to go away, those in the lower one taking their places. By this plan we ensure the sheep being thoroughly drained, and also save a good deal of the dipping mixture.

"It is necessary to add fresh liquor from time to time, to keep up both the heat and proper strength, and also to supply the place of that which has been used. The amount required will depend very much upon the length of the animal's wool. The sulphur is kept floating in the bath by the agitation of the fluid, by which means it settles in the wool, acting, I have no doubt, as the chief *preventive* of scab.

"When this disease exists it is usual to dip the sheep again, at the end of a fortnight; but, in my opinion, one *thorough soaking* is sufficient, if done in *hot liquor*. The tobacco is best boiled in bags, and it is then easily removed from the copper when its strength has been extracted. *Leaf tobacco* is, I think, the best, but all the common sorts are used. Many of the settlers grow their own tobacco, but rather more of this is required, it not being very strong."

Our experience in dipping sheep would have led to the conclusion that, by such a summary process as here described, many of the animals would be destroyed, but we are assured that such is not the case. Doubtless some are sacrificed, but the number cannot be considerable or the plan would soon be abandoned. Indeed, we have been informed that in several parts of Australia even less care is taken than is mentioned by Mr. Aunaud, and that the animals are forced so hastily in small lots into pits which are sunk in the ground and filled with decoctions of tobacco, that they often plunge completely under the fluid. One thing at least we may learn from these proceedings, namely, that sheep may be totally immersed in a tolerably strong decoction of tobacco with but little risk to their lives. We are not, however, to conclude that a bath of the strength named could be safely employed, supposing it to be made with prepared tobacco of commerce. Australian leaf tobacco is employed, and the quantity used would appear to show that it is not very strong.

With the shag tobacco of commerce we have rarely ventured, in making a bath, to use more than an ounce to an ounce and a half to the gallon of water. Tobacco, as is well known, varies greatly in strength, and hence it is always "better to err on the safe side." For these reasons farmers should always make their own tobacco water, and never purchase it of the tobacco manufacturers. It frequently happens that such water is valueless, or nearly so, although it is so dark colored as to mislead the purchaser.

Not only in Australia, but, likewise, in America, tobacco baths are in much request. A few years since an attempt was made to introduce into this country an "extract of tobacco," manufactured

by the "Southdown Company" of Boston, Mass., and patented by Mr. Jacques, for the making of "sheep dips." It met, however, with little encouragement. The samples of the "extract" which we saw were nicely manufactured, but the article could not compete in price with our common sorts of the drug, especially when the quantity to be used, an ounce to the gallon, was taken into consideration. The "extract" is, we are told, much used in America, and with the best results.

Arsenical solutions.—The cheap uses and efficacy of these compounds have led to their very general use by flock masters. When properly prepared and rightly used, although containing a deadly poison, they are nevertheless safe even for the dipping of lambs as well as aged sheep.

Great improvements have been made in these compounds of late years, and few of them now contain arsenic, excepting in the form of an arsenite of potash. This preparation is equally as destructive to parasites as arsenic itself, but less likely to be injurious to the sheep, as its greater solubility prevents its subsiding to the bottom of the dipping tub, thus to be brought in contact with the skin of those which are dipped when the fluid is nearly consumed.

So many accidents have occurred from the careless manner in which arsenical solutions are dealt with on the premises of farmers, that it is a serious question whether they ought not to be entirely superseded by non-poisoning compounds. A little more than a year ago ten persons were poisoned at a farm at Ashby St. Ledgers, near Rugby, from a cause of this kind, and one of them, a laborer, died. Some of the arsenic, in an unexplained manner, got mixed in a pudding made by the mistress of the house for herself, family and servants, she having on the morning of the same day assisted her son in preparing the sheep-dipping compound.

Numerous instances are also recorded of the poisoning of animals from a want of due care in disposing of the superfluous or *unused* quantity of the mixture after the dipping is finished. As an example we may mention that an influential member of the Royal Agricultural Society lost *twenty-two* pigs in the summer of 1859, from the shepherd emptying the spare liquor into a yard where the pigs were kept. The weather at the time was very hot, and the animals, driven by extreme thirst, drank some of the fluid, and soon fell a sacrifice to its poisonous effects. We have also known of cases where nearly all the ducks on a farm have been killed by the superfluous "sheep wash" being emptied into a

muddy ditch to which the birds resorted. It is likewise no uncommon thing for fish to be poisoned, if it be thrown into a pond, or even into a running stream.

Another serious drawback to their employment of arsenical solutions is the injurious effects which are produced on the hands and arms of the men engaged in the dipping. The nails of many of them are almost destroyed thereby, whilst in some, unhealthy sores and ulcers of the arms follow the day's work. The men also are too careless in protecting the lower parts of their persons from the action of the poison, often neglecting to put on an additional covering to keep their clothes from being soaked through with the fluid. Such serious ill consequences have now and then resulted from this, as even to endanger life.

Much more might be said against the use of arsenical solutions for the dipping of sheep, but in an essay of this kind it is unnecessary to add to these instances of the danger which is incurred.

A useful formula for the making of an arsenical bath is as follows: Take of arsenic half pound, soft soap half pound, carbonate of potash four ounces, and water twenty gallons; boil the arsenic and the potash together in one half of the water, and dissolve the soap in the other half; afterwards mix together for use. This will make a bath sufficient for twenty sheep. It should be used moderately warm, as it will then be found to be more efficacious in the destruction of parasites, and less hurtful to the sheep, than plunging them into the fluid when cold.

Sulphuretted Mixtures.—These mixtures in their simple form being free from any deleterious agents, find favor with many farmers for the dipping of ewes while suckling their lambs. They should not, however, be depended upon for the destruction of ticks, unless combined with a narcotic vegetable decoction; that of tobacco being probably the best. The advocates of their use contend that it is only necessary to keep the sheep in the sulphur bath rather longer than the ordinary time to have its full benefit produced, and that any failure which may arise is due to a want of precaution. We have often used a simple sulphuretted mixture, and have rarely found it productive of sufficient amount of good to warrant our recommendation of it. It is true that if the sheep are examined directly after coming out of the bath, the ticks, from their half-drowned condition, will appear to be dead or nearly so; but on the drying of the wool most of them will revive and become as active as ever.

A common sulphur bath is generally composed of soft soap, $1\frac{1}{2}$ lb. ; carbonate of potash, $\frac{1}{2}$ lb. ; and sulphur virum, $2\frac{1}{2}$ lbs. ; boiled together for about half an hour in twenty gallons of water. A small portion of the sulphur is dissolved by this process, but nearly the whole of it is still suspended in the fluid. The undissolved portion quickly sinks to the bottom, and consequently a mixture of this kind requires to be often stirred up. The quantity named will be sufficient for twenty sheep.

As before stated, it is absolutely necessary that the sheep be kept in the bath for four or five minutes, which makes the process a very tedious one where many have to be dipped in the day. It is also important that the mixture be used warm, or it will be even less effective. A sulphuretted bath is valuable, however, in long existing cases of scab, as it cleanses the skin, tends to break up the crusts which exist, and also to destroy some of the acari. Nevertheless, even under these circumstances, it is to be regarded as preparatory to the employment of more potent remedies for the cure of this affection. The addition of sulphur to an arsenical compound may be an advantage in some exceptional cases of parasites, but as a rule the arsenical preparation is sufficiently powerful of itself not to need any addition of the kind.

Carbolic Acid Compounds.—Baths for sheep-dipping, in which alkaline carbolates with tarry matters form the chief anto-parasitic agents, are of modern introduction. These compounds, although they may not so quickly destroy ticks as some of the arsenical mixtures, bid fair, nevertheless, to supersede them, and also many others of the older preparations, for the reason that they are innocuous to the sheep themselves, and at the same time very efficacious in the destruction of parasites in general. Some of the carbolic acid compounds possess a value also far beyond better known and more common agents, viz., that of protecting the sheep for a considerable time against the attack of flesh-flies. This prophylactic power depends chiefly on the peculiarity of their odor, which is similar to that of tar, and is long retained in the wool. Sheep dipped in these mixtures will be found to be feeding, and resting in comfort ; while others, not so treated, will be incessantly tormented with flies ; an advantage so obvious that it would alone suffice to recommend these compositions to the favorable notice of the flock master. Some persons take objection to them in consequence of the tarry matter imparting a brownish color to the wool. This, however, is only a temporary evil, if one at all, as the stain

is easily removed by washing; indeed, it will be found to fade away of itself after a few weeks exposure to the ordinary changes of weather. The best of these compounds usually consist of carbolic acid of soda with tarry matters. They mix easily with water, and do no injury to the hands and arms of the sheep-dippers.

We refrain from giving any special formulæ for the making of carbolic acid compounds, because we lack practical experience of the *relative* value when mixed in varying proportions of their several ingredients. Besides, it is far more to the advantage of the farmer to purchase from a respectable manufacturer than to attempt the making of them himself.

Both the value and safety of very many sheep-dipping compositions depend on the proper mixing and preparing of their several ingredients, and the appliances at the disposal of the farmer are too often unequal to such an undertaking.

Having thus epitomized the subject of sheep-dipping mixtures, we pass on to make some observations on the proper period for dipping sheep, and also on the occasional ill consequences which arise therefrom. The proper time for dipping will very much depend on the kind of sheep which are kept, and also on the system of sheep husbandry which is carried out on the farm—things which are in a measure regulated by locality and soil. In some districts almost of necessity “breeding sheep” are kept, and “fattening sheep” in others. Besides this, all breeding flocks are not managed alike, any more than the same system of fattening is observed by all feeders of sheep.

In some parts of the country ewes are kept for breeding until they are quite worn out by age. In others about a third of the flock is changed every year by the bringing in of the ewe lambs, and letting out a corresponding number of the old and less valuable ewes; while in many the entire flock is changed every year by first fattening and disposing of the lambs, and afterwards of the ewes. It is therefore apparent that no one time can be fixed upon as being suitable to meet the requirements of each of these cases.

Where the system of buying in ewes every year is adopted, we prefer to dip them just before their being put to the ram, say in September. This not only frees them from ticks, but also from acari, and thus affords security to a great extent against the scab during the succeeding winter months. Ewes kept on the farm year after year are perhaps best dipped subsequent to weaning time, in July. If, however, from the multiplicity of parasites it

becomes *absolutely necessary* to dip them while suckling their lambs, care should be taken not to use arsenical compound. In the latter case the lambs also must be dipped at the same time, or little or no good will result, for the ticks will soon travel from the lambs back to the ewes, and infest them as badly as before. The dipping of lambs is mostly deferred until they are weaned; but the late Lord Spencer tritely remarked in his comments on this practice, as recommended by Mr. Oleeve in an essay on "Diseases of Sheep," published in the first volume of the Society's Journal, that "It is better to dip the lambs immediately after the ewes are shorn, than after weaning. The shearing the ewes destroys or removes the ticks which were upon them, and the dipping destroys those which were upon the lambs; whereas, if it is postponed till the lambs are weaned, the wool of the ewes will then have grown long enough to shelter ticks which have come upon them from the lambs after the time of shearing."

Sheep intended to be fattened, during the winter, on turnips, &c., are best dipped in the autumn or latter part of the summer; but hoggets, which had been dipped as lambs, and which are to be grass fed during the succeeding summer, should be dipped the second time in the spring, after coming from their winter keep. A neglect of this frequently causes much loss of wool, and, not unfrequently, attacks of scab.

Persons who, in the spring of the year purchase sheep of different kinds and in various quantities, for summer grazing, should, always, if possible, dip each lot directly the animals arrive on the farm, certainly before they are mixed with the former lots. If this be not done, the loss, both in wool and mutton, may prove a serious matter from an attack of scab, it being well known that this disease frequently breaks out among sheep thus brought together. Farmers who merely breed, feed and sell out from their own flocks have fewer difficulties to contend with, and hence, as a general rule, they content themselves by dipping their sheep after shearing time, when the wool is somewhat grown, a practice which may suit their peculiar case, and theirs alone. Whatever time is selected, and this must necessarily vary in almost every individual instance, care should always be taken to avoid extreme hot and dry, as well as showery weather.

As can be easily understood, sheep are very liable to be destroyed by the use of poisonous dipping mixtures, from the deleterious agents being absorbed into their systems from the general surface

of the skin. In many instances we are ready to admit that absorption is the cause of death; but after several years' experience in the matter, we are persuaded it is far less frequent than is generally supposed. Mischief results more often from hasty dipping, and the neglect of proper precautions subsequent thereto, than from absorption of the poisonous compound. When sheep are placed in the bath, and are, necessarily held in an unnatural and restrained position, to prevent their splashing the mixture about, the greatest care should be taken that their heads are not thrust under the fluid. Without due caution it often happens that the animal, while struggling to overcome the restraint to which it is subjected: involuntarily and almost momentarily swallows a portion of the fluid. Hence there are many instances where death results from asphyxia very shortly after the sheep are set at liberty; a portion of the fluid having entered the larynx. Such animals usually retire a short distance, lie down, have a distressing cough, breathe heavily, and quickly die. Occasionally, also, it is found that several of the sheep die a day or two subsequently to their having been dipped, from the local effects of the fluid upon their throat and fauces. In these cases, the corrosive action of the arsenical solution forbids all hope of cure. In a far greater number of instances, however, the poisonous draught enters the stomach and destroys the animal by its action on the system.

A more frequent cause of death, however, is that of imperfectly squeezing the superfluous fluids from their fleeces, and allowing the animals to go almost at once on to a piece of pasture land, where they not only stand and drip, but often lie down, and thus leave a considerable portion of the arsenical mixture on the grass. Nor will the sheep refuse to eat such grass, but rather show a preference for it while it is wet, more especially in very hot and dry weather. In such a way as this, scores of sheep are often poisoned.

Sheep have also been poisoned now and then from sucking their own or each other's fleeces while still wet from the bath. This, likewise, occurs generally in hot and dry weather, when they have not been supplied with water, although unable to obtain any, perhaps, for many days before, in consequence of the particular position of the fields in which they had been kept.

Very fatal results have also followed from the sheep being overtaken by a drenching rain within a few hours of being dipped. In this way the dipping compound has been washed out of their

fleeces and poisoned the entire herbage on which they were feeding. All these things may be easily guarded against by proper management. Their prevention is so obvious that it need not be specially mentioned in a paper of this kind; it being sufficient for our present purpose that we draw attention, in a concise manner, to the several causes which are likely to lead to a loss of sheep from dipping.

Pediculi; Anoplura (Denny).—LICE.

Under the generic term of *Pediculi* we recognize those *Epizoa* commonly known as lice. These parasites constitute the order *Anoplura* of Denny, being unarmed and without wings. From their great variety they are necessarily divided into several families, genera and sub-genera.

The primary division of the *Anoplura* is into the *Haustellata* (suckers) and *Mandibulata* (masticators), or which we have examples in the genus *Haematopinus* and *Trichodectes* which affect domesticated animals. The former of these is easily distinguished by its elongated and narrow head and retractile sucker; and the latter by its broad and short head and strong mandibles. The chief characteristics of lice are that they do not undergo a metamorphosis, have six legs, are without wings, and often also without eyes, or possess two only, which are of simple construction in comparison with those of other insects.

Although lice do not pass through a regular metamorphosis, nevertheless, in the progress of development from the embryo to the perfect insect, they are found to cast their skin, and often more than once, acquiring each time a more complete form of the body, and especially of the limbs. In these particulars, these *epizoa* agree with fleas and some other parasitic insects. Küchenmeister says that the "*males* are fewer in number than the females, their last abdominal segment is prominent and rounded off, and furnished on its dorsal surface with a valvular opening, beset with an abundance of asperities, which serves at the same time as an anal opening and *porus genitalis*."

"The *females*, which are more numerous and larger, appear deeply notched at the apex of the last abdominal segment, and, as it were, with two lobes, between which is the anal aperture, which is surrounded with numerous hairs."

The two genera, *Haematopinus* and *Trichodectes*, which we have described, not only exist separately, but often together on the same

animal; but hitherto we have only found the *Hæmatopinus Suis* on the pig, and the *Trichodectes Ovis* on the sheep; nor does Denny, in his *Monographia Anoplurorum Britannicæ*, allude to any other louse as being met with on either of these animals.

Whether the pig and the sheep are entirely exempt from all other varieties of lice, we do not take upon ourselves to decide.

As a rule, however, each distinct species of animal has its own particular variety of louse; and it is a singular fact that the parasite shows little or no disposition to leave the body of its host for that of any other. By long cohabitation, however, the louse of one animal will occasionally travel to another of a totally different species, and not only live upon its new victim, but speedily propagate, and thus produce an attack of phthiriasis. The introduction of a lousy animal among a number of healthy ones of the same species, is sure to be followed by all of them, becoming sooner or later affected. The rapidity with which this sometimes takes place is very remarkable; but it appears to be always accomplished much more slowly during the winter than the summer months. This circumstance is easily accounted for, as the parasites are less active in the winter, both in their ordinary wanderings from animal to animal, and also in their powers of reproduction. It is also not improbable that some kinds of lice leave the body of one animal for that of another much earlier than others, and this under precisely the same circumstances.

"No man, perhaps," writes Denny, "ever carried his researches on the habits of the louse to a greater height than Leeuwenhoek, who allowed his zeal for science to overcome the disgust which such creatures generally produce. In order to ascertain the rapidity with which a louse can propagate its species, he tried the following experiment, which I shall give in his own words:

"The louse is so prolific an animal that it is a common, vulgar saying that it will be grandfather in the space of twenty-four hours. This I could never believe to be the fact, but rather that it would require nearly a month for the offspring of a louse to be capable of producing young of its kind; and in order to make proof of it by experiment, I at first proposed to hire some poor child to wear a clean stocking for a week, with two or three female lice in it, and well tied or secured at the garter, in order to see how many young ones would be produced in that space of time; but I afterwards considered that I could make the experiment with much more certainty on my own person, at the expense only of enduring in one leg what most poor people are obliged to suffer in their whole bodies during all their lives. Hereupon I put on one leg, instead of a white stocking I usually wear, a fine black stocking, choosing that color because I considered that the eggs and the young lice thence proceeding would be more easily distinguished upon it. Into this stocking I put two large female lice, and cutting another black stocking into long slips, I bound it over the first, above the knee, to prevent their escaping. After wearing this stocking six days, I took it off, and found one of the lice had laid fifty eggs, and the other about forty. I opened the one which had laid the fifty eggs and found in

its body at least fifty more, and who knows how many eggs it had laid before I put it into the stocking, and how many more eggs it might have in its body, which my sight could not reach? Having worn the stocking *ten days longer*, I found in it at least twenty-five lice of three different sizes, some of which I judged were two days old, others a day old, and the rest newly come out of the egg.'

"To give a clearer conception of the great increase of these animals, let us suppose a person to have about his body two male lice and as many females, and that the females in 12 days' time lay 200 eggs; and that six days afterwards out of those eggs are produced 100 males and 100 females; and that this young brood in 18 days' time are grown to a size to propagate their kind, and that each of these young females in the space of 12 days more lays 100 eggs, and from which in six days' time other young lice are produced; upon this supposition the number of lice springing from two females will amount to 10,000. Thus it appears that the two females may in eight weeks' time be grandmothers, and see 10,000 lice of their own offspring, which unless reduced to actual demonstration would seem incredible; and who can tell whether in the heat of summer these creatures may not breed in half the time I have mentioned."

Whether these hypotheses with regard to the reproductive powers of the louse be absolutely correct or not, we see quite sufficient in the experiment itself to explain the fact of one lousy animal quickly contaminating another, and often an entire herd.

Leeuwenhoek's experiments being made with lice of the human subject, the parasites found in him a proper host, and consequently his conclusions with reference to the deposit of eggs, and the time necessary for the production of the *first* hatch, would be correct. Whether similar experiments of transposing lice of the horse or ox, to other horses or oxen, as proper hosts, would give a result confirmatory of Leeuwenhoek's suppositions of the rate of increase, remains to be proved. As yet we have had no opportunity of testing this by direct experiment. We have, however, very frequently collected the ova of the different kinds of lice, and adopted means of keeping them under daily observation, and at a temperature equal to that of the animal body, so as to determine the period of incubation. The results seem to show that the time which elapses between the deposit of the ova of the *Hæmatopinus Bovis*, for example, by the parent louse, and the birth of the young ones, is about twelve or fourteen days. We have frequently known a hatching to take place as late as the *fourteenth* day, but never after that time. On obtaining ova from the bodies of animals for a purpose of this kind, it is found that some of the young will be hatched even on the first or second day afterwards, and others at different intervals up to the date named. This variation in time is due to the circumstance that the ova when taken are not all of the same age, and consequently the young lice are in different stages of development. It is almost impossible to distinguish the fresh laid

eggs from the older ones, so that correct conclusions as to the period of incubation can only be arrived at from the *latest* births, the ova yielding these young lice having been laid by the parent probably on the very day these were procured.

The matured ova are expelled singly from the uterus of the parent, and each one in succession is attached by a glutinous material, which is voided with it to the lower part of a hair near to its root. Sometimes three or four ova will be found adhering to the same hair, but generally only one is met with. Each egg is so fixed as to leave the larger end free, which is always directed towards the point of the hair. The egg is also attached to the hair in such a manner as to form a very acute angle with it, leaving just sufficient space to allow of the young louse grasping the hair with its claws as it makes its escape from the egg by raising the operculum at the larger end, thus securing its safety against falling off and being lost. The empty ova cases will remain *in situ* for a considerable time after the birth of the young lice, and sometimes lead to an incorrect conclusion that the animal is still covered with "nits." They are, however, easily distinguished from perfect eggs on a slight examination.

LICE OF THE HORSE.

It has already been explained that two varieties of the louse are common to the horse—the *Hæmatopinus* and the *Trichodectes*. The former of these is much the larger. It is also darker in color and has a longer body and head than the other. The *Hæmatopinus Equi* more frequently locates itself among the stiff hairs of the tail and mane than the *Trichodectes*, but it will nevertheless be often distributed over the entire body of the animal. It is not easily dislodged from its location, in consequence of its sucking organ being inserted into the skin for the purpose of obtaining its food. For this reason *Hæmatopinus* produce considerable and persistent irritation; and the horse will rub himself so violently to get rid of his tormentors as very frequently to produce extensive excoriations of the skin. From the same cause his health will soon suffer, and he will quickly fall away in condition. Horses which are neglected as to grooming and feeding, or such as are suffering from ill health are, as is well known, very susceptible to attacks of lice. *Hæmatopini*, however, are often met with under the opposite circumstances; and hence search should be made for them in obscure cases of cutaneous irritation. We have frequently found these

lice on horses which were at the time in good condition, and under the best stable management, and consequently not suspected to be lousy.

Trichodectes Equi.—The broad headed louse of the horse shows a preference for the body, and, unless present in very large numbers, seldom locates itself in the hair of the mane or tail. Its pale color, small size, and square form, at once distinguish it from the *Hæmatopinus*. Being a masticator, it is unprovided with any sucking organ, and consequently it does not fix itself to the skin, although it lies in close contact therewith. It feeds upon the desquamating epidermis, and also upon the increased exudations that come from the skin as the result of the irritation it produces. Being fond of warmth, the *Trichodectes* rarely quits the surface of the integument during cold weather, so as to become visible by traveling up the hairs. If, however, the affected animal be placed in the sun for only a few minutes, these lice will speedily scale the hairs and appear on the surface, often in such numbers as to surprise the groom or carter. Horses affected to this extent are sure to be in impoverished condition, besides suffering considerable cutaneous irritation.

Poverty, exposure to inclement weather, innutritious food, a dirty state of skin, and similar causes, predispose animals to an attack of these lice; and consequently they are often present on horses which are turned out during the winter months. Colts whose health is impaired, and especially if they are the subjects of chronic disease, are, however, even more susceptible to them. Confirmatory of this we give the following case which has recently come under our notice:

A thorough-bred filly, between two and three years of age, was admitted into the Infirmary of the Royal Veterinary College in consequence of a diseased state of the absorbent system, which had existed for several months. Being unbroken she had not been regularly stabled, but had had the run of a paddock in which a shed was placed. It had been noticed that of late she had suffered from cutaneous irritation, but the true cause of this was not suspected. Very shortly after her admission an examination of the skin showed that she was literally covered from head to foot with lice. Although diligent search was made, not one of the *Hæmatopini* could be found; the epizoa being all of the genus *Trichodectes*. The care and attention which this filly had received were sufficient to make

it more than probable that it was not from neglect, but solely from impaired health that she had been attacked with these parasites.

The destruction of lice is not difficult; but to effectually free an animal of them it is necessary that their ova—the “nits”—be killed as well as the parasites themselves. For this purpose the antiparasitic agent must be again applied to the skin after an interval of five or six days, and in some instances even a third application of it will be required after a similar lapse of time. Oleaginous preparations are very effective for the purpose, especially if mixed with sulphur and oil of turpentine, but they are sometimes objectionable on the score of cleanliness, if used upon our better bred horses. A good mixture of the kind is composed of pure neat's foot oil, ten parts; oil of turpentine, five parts; and sulphur, two parts. In using this compound care should be taken that the animal be dressed from head to foot with it, or many of the parasites will escape unharmed.

Decoction of tobacco made by boiling from one to three ounces of strong shag tobacco in a gallon of water, and, when cold, saturating it with common salt by adding about three pounds of this agent to the gallon, is a clean, safe, and very effective remedy when properly applied. The same may also be said of a saturated solution of the sulphide of potassium, which should, however, be applied to the skin as soon as made.

Mercurial and arsenical preparations ought never to be used upon the horse, so large a quantity being required to cover his skin. They possess no advantage over more simple and less dangerous agents in the destruction of lice, while they have often been known to produce serious ill consequences, both by their local action and by their being absorbed into the system.

Both varieties of the louse of the horse are also common to the ass. They are by no means unfrequent dwellers on this animal, as may be inferred from the great privations he has so often to endure and the sad neglect to which he is exposed. If well fed, however, and kept only moderately clean, the ass does not appear to be more susceptible to these parasites than the horse, if indeed he be so much so.

LICE OF THE OX.

Both *Hæmatopinus* and *Trichodectes* are met with on the ox; the former perhaps more frequently than on any other domesticated animal. The *Hæmatopinus*, however, chiefly inhabits the furrows

of the skin on the upper part of the neck and shoulders, to which it is often confined for weeks together. Its existence here is not necessarily connected with ill health, nor with lowness of condition; on the contrary, it is met with on cattle that are gaining flesh and going on perfectly satisfactory. Especially is this the case during the winter, when the cattle are in the fodder yards. So common, indeed, are these lice at this time, that specimens may be procured from nearly every herd which is examined, both young and old animals being equally affected. During this time of year, also, the lice are very inactive, and show but little disposition either to leave their favorite spot, or to travel from one animal to another. Hence we find that some animals will be affected and others not, although they are all herded together, and are necessarily managed the same. On the approach of spring, however, the *Epizoa* lose their inactivity, become more prolific, travel to other parts of the body, and pass freely from one animal to another. Evidence of this changed state of things is soon afforded by the irritation which they produce, leading the cattle to rub themselves bare in many places, particularly about their shoulders and buttocks. This nude state of skin is not unfrequently the first thing to attract the attention of the owner, and lead him to a knowledge of the fact that the animal is lousy.

The *Hæmatopinus Bovis* is larger than his congener of the horse, and darker in color, being usually of a deep brown hue. The depth of its color will, however, depend very much upon the amount of blood it contains. It remains firmly fixed by the insertion of its sucker into the skin, for so long a time together, that it would appear to use this organ for the purpose of holding on, even after its digestive system is filled with blood.

Trichodectes Bovis.—This louse is a type of the genus as occurring among domesticated animals. Its broad head and pale or yellowish color at once serve to distinguish the parasite, no matter upon what part of the body, or upon what animal it may exist.

We have met with these lice in great abundance upon young cattle, yearlings in particular, and especially those that had been badly kept after being weaned. Such animals are generally low in flesh and have a most unhealthy appearance. They suffer much cutaneous irritation, and are so unthrifty that all the food given them seems to be of no avail in improving their condition. It is also during the winter half of the year that these lice abound, and it is usually in the spring, from their rapid increase, that attention

is given to rid the animals of them. No part of the body is exempt from their attack, and very often an animal will be covered all over with the parasites, causing him to rub and lick himself so continuously as to produce extensive excoriations of the skin.

When these lice are present in no very large numbers, some persons trust to the shedding of the coat as the spring advances, for freeing the animals from them, it being well known that, with the fall of the hair, many of them, together with the "nits," will be cast off. This fact is due to the circumstance before explained, that these lice live among the hair, feeding upon the desquamating epidermis, and not upon the blood of the animal, and hence they are not fixed to the skin. It is not an unfrequent remark of such persons, "Oh! a few lice won't do any harm; they'll soon be gone when the bullocks get to grass." Dependence, however, should never be placed on the fall of the hair, for it often happens that the animals will continue to be lousy throughout the whole summer, and come back in this state to the yards in the following autumn or winter very little improved in condition.

In the application of remedies for the destruction of lice on cattle, even a greater necessity exists for avoiding all arsenical or mercurial compounds than when they are present on the horse. Cattle, as is well known, are in the habit of *licking* themselves wherever their tongue can reach, and not only so, but they will also freely lick each other. In this way scores of animals have been poisoned when dressed with these and similar deleterious agents. One notable case came, many years since, under our immediate observation, in which no less than eleven yearlings were killed out of thirteen, by their owner having used upon them an arsenical compound, which he had procured from a druggist.

In the "Transactions of the Veterinary Medical Association" for 1841-2, a case is recited by Mr. H. Hutchinson, M. R. C. V. S., East Retford, in which fifteen bullocks were poisoned, one of which died, in consequence of being dressed with "a solution of arsenic and soft soap." In the "Veterinarian" for 1843, Mr. C. Landor, M. R. C. V. S., Dumfries, relates an instance of thirty-two animals being washed with an arsenical sheep-dip, eight of which died. An allied case is published in the "Veterinary Record" for 1846, by Mr. E. Musgrave, M. R. C. V. S., Hereford, in which two deaths occurred out of "twenty-eight cows, yearlings and calves," that were dressed for lice.

Many other instances of the kind might be mentioned, as scarcely

a year passes without similar mishaps. We will, however, content ourselves by giving one other, which is replete with information, and somewhat of a singular character. The case is related on the authority of Mr. R. Bowles, M. R. C. V. S., Abergavenny, who furnished us with the particulars a few years since. It appears that a notion prevails in many parts of Wales, that when cattle are affected with lice it is only necessary to smear the *base of their horns* with strong mercurial ointment, and the parasites will quickly disappear. Acting on this vulgar error, a farmer obtained some ointment, and used it pretty freely upon the horns of his cattle, some fifteen or sixteen in number. On the following day the greater part of them was found to be seriously ill, and the assistance of Mr. Bowles was sought. On investigating the case, Mr. Bowles found that the animals were poisoned with the mercurial ointment *which they had cleanly licked off from each other's horns*. Notwithstanding all the care which was given to the cases, nearly one half of them proved fatal, and the rest of the animals were saved with very great difficulty.

Having said sufficient, we trust, by way of caution in the use of these poisonous compounds, we shall conclude our remarks by stating that the same remedies which have been recommended for the destruction of lice on the horse, are equally efficacious when applied to the ox. They should be used in the same manner and at the same intervals of time. For cattle, however, which have to be dressed *all over*, the oleaginous compound mentioned at page 188 is often to be preferred to any other.

LICE OF THE CALF.

As an addendum to the preceding remarks on the lice of the ox, we may state that Denny has described a variety of *Hæmatopinus* as existing on the calf, which differs in several respects, but particularly in the length of its abdomen and the thickness of its limbs, from the louse of the older animal. He says that "the only two examples of this species which I have examined were kindly forwarded to me by Rev. L. Jenyns, who found them upon a calf. Mr. Jenyns named them *vituli*, and I have no doubt they are the species so named by Linnæus and Fabricius. It may appear somewhat strange that a young animal should have a distinct species of parasite, which is not found upon its parents; but as far as I am able to judge, such is the fact."

In the course of our investigations we have often sought for this

louse, but hitherto without success. We have also had numerous specimens obtained from calves sent us from different parts of the country, and these have always proved to be of the kind common to the older animals.

LOUSE OF THE SHEEP.

We insert this heading in this place for the sake of completeness, as we have in another part of this essay fully described the kind of louse met with on the sheep. The *Hæmatopinus*, as has been stated, is unknown as being parasitic to this animal, while the *Trichodectes* is also rare, excepting in particular localities. Our description of the *Trichodectes Ovis* will be found at page 173, *et seq.*, to which we refer the reader.

LOUSE OF THE PIG.

One variety only of the two kinds of lice, so frequently alluded to in these pages, is met with on the pig, viz., the *Hæmatopinus Suis*. Its great size, broad and flat body, thick ungues and dark brown color, at once suffice to distinguish the *Hæmatopinus* of the pig from that of any other animal.

On many farms these parasites are but rarely seen, while on others they are of rather frequent occurrence. The cause of their absence seems not to be well understood, as it does not appear to depend on greater cleanliness nor on a better system of management. Store pigs are mostly affected, but we have seen the lice at times on fat ones. The use of barley straw for bedding, as well as its almost exclusive employment in the fodder yard, is generally thought to encourage their attack. This idea is not improbable, for it is an admitted fact that pigs, and especially young ones, do not thrive satisfactorily if made to sleep on barley straw, and any cause which will impair the health of an animal will at the same time predispose an attack of parasites.

Denny, in his remarks on this louse, says that it "is found in great numbers on swine, but it does not appear so generally spread as it might be expected from the dirty habits of these animals. It most frequently occurs on those fresh imported from the sister isle. It was many months before I could obtain a single example. I had applied to both farmers and pig butchers, neither of whom seemed to approve of the idea which I had conceived of *their* pigs being *lousy*, but referred me to those of the Emerald Isle as being sure to gratify my wishes—forgetting, I suspect, that

Irish pigs come to this market to meet English buyers. I accordingly visited a colony just arrived, when I most certainly met with a ready supply, but here they were confined almost entirely to lean animals, and wherever I found a pig fat or healthy, no game were to be seen.

In walking, this species uses the claw and tibial tooth with great facility—which act as a finger and thumb—in taking hold of a single hair. The male is smaller than the female, with the abdomen shorter, sub-orbicular, and the segments lobate. The egg or nit is three fourths of a line in length, of a cream color, and elegantly shagreened, oblong and slightly acuminate, surrounded by a lid, which, when the young insect is ready to emerge, splits circularly.”

The *Hæmatopinus Suis* shows a preference for the upper portion of the neck and the parts behind the ears, and also those between the fore legs, where the skin is comparatively thin; being less frequently met with on the sides and hind quarters of the animal, except when present in large numbers. It will generally be found firmly fixed to the skin, drawing its supply of blood by its haustellum, which organ is conical in shape and very prominent in this species. The irritation produced by the parasite is considerable, and cracks and sores of the skin often result from its presence; but the pig seems to regard this much less than many other animals. As a rule, however, even when existing in great abundance, *Hæmatopini* would appear to cause an unthrifty state of the animal rather than simple cutaneous disease. Like the *Hæmatopini* of the ox, these lice are very often seen on pigs during the winter months when they are confined to the fodder yard, disappearing on the approach of warm weather when the animals have a greater range and can “wallow in the mire.”

The frequent existence of *Hæmatopini* in association with inflamed and sore state of skin, led, in the days of ignorance and superstition, to the belief that the parasites buried themselves beneath the integument, and after a time made their exit from the body through the various organs. Thus Youatt remarks in his work on “*The Pig*,” that “Erie Vibourg states that these vermin sometimes burrow their way into the flesh, and come out through the eyes, nostrils or mouth, or have even been known to be voided in the urine.”

It is not difficult to rid pigs of lice, but for the reasons before advanced, it is necessary to repeat the anti-parasitic agent two or

three times. The sulphur liniment mentioned at page 179 is to be preferred for use on the pig, and besides this none other is likely to be required. Although the Epizoa may be apparently confined to one part of the body, it is better to dress the animal all over to make sure of the ova being destroyed, as well as the parasites themselves.

LICE OF THE DOG AND CAT.

Varieties of the *Hæmatopinus* and *Trichodectes* are the only lice, so far as we are aware, which have yet been found on either of these animals, the former being more rare than the latter. Dogs affected with lice suffer a great deal of itching of the skin. They usually fall away in condition, and have a very unhealthy appearance, both of the skin and hair. Young dogs are, upon the whole, more often affected, and not unfrequently they become so when suffering from distemper, or when just recovering from this disease. We have, however, frequently met with lice on dogs which were in the most healthy state, and receiving the greatest care and attention as to feeding and management. Indeed, the pet dog of the drawing-room will now and then be attacked by these parasites; although more frequently it is the cur, which is made to inhabit dirty sleeping places and is neglected in every possible way, that suffers from them. The irritation produced by lice often gives rise to the notion among persons who are not very conversant with the diseases of the dog, that he is the subject of mange. A very slight examination, however, by leading to a detection of the parasites, will suffice to show the true cause of this irritation.

These same remarks are equally applicable to the cat, excepting perhaps that this animal is less frequently affected with lice than the dog.

The means which are employed in ridding other animals of lice will be found effective with these, but for many years we have adopted a very simple expedient for the purpose, which has generally proved most successful. It consists of dusting the skin over with common snuff, and two or three days afterwards well washing the animal with soap and water, and as soon as the skin is dry, repeating the application. A second or third dressing of this kind will suffice to kill all the parasites and also their embryos, if adopted with due regard to the period of incubation of the ova. Attention must likewise be given to a restoration of the animal's

health, from whatever cause it may have suffered, or he will be exceedingly liable to be again attacked by these loathsome parasites.

Acarus Folliculorum.—ANIMALCULE OF THE HAIR FOLLICLE.

This parasitic animalcule belongs to the class *Arachinda*, and represents, according to Prof. Owen, "the lowest organized form of the class." It has received various names both here and on the continent, the chief among which are: *Demodex Folliculorum*, OWEN; *Entozoon*, afterwards *Steatozoon Folliculorum*, WILSON; *Macrogaster Platypus*, MIESCHER; *Acarus Folliculorum*, SIMON and SIEBOLD; and *Simonea Folliculorum*, GERVAIS, the last name being given in compliment to Dr. Simon, of Berlin, who discovered it in 1842, in his investigations of the disease known as *Acne* in man. Küchenmeister states that it was found by Heule at about the same time in the hair follicles of the external ear, but that Heule in describing it mistook "the tail for the head, and the feet for sucking discs composed of pads."

In 1843-4, Mr. Erasmus Wilson fully investigated the structure and habits of the entozoon, which led to his ultimately giving to the world the best account of it which we possess. He thus prefaces his description: "After perusing the account of the *Steatozoon Folliculorum* as given by its discoverer, Dr. Simon, I determined to proceed to a verification of his discoveries, and being provided with an instrument probably superior to that employed by Dr. Simon, I have succeeded in making out certain points of structure that had escaped his observations. I was not long in obtaining subjects; almost every face I met with supplied me with abundance, and the difficulty seems to be, not to find the creature, but to find any individual with the exception, according to Dr. Simon, of newly born children, in whom these animalcules do not exist."

In the course of his researches, Mr. Wilson discovered several of these parasites, seemingly identical in every respect to those of man, in the secretion of the meibomian glands of the eyelid of a horse which had been furnished him by my late colleague, Prof. Morton. Küchenmeister also records that Oschatz found a similar *Acarus* in the glands of the eyelids of a sheep. It was, however, broader generally, and especially in front.

Besides these instances, we are not aware that the animalcule has yet been met with in any other domesticated animals, except-

ing the dog, in whom, however, it is not uncommon. In the latter part of 1843, Mr. Topping, a preparer of objects for the microscope, led by the publicity given to this question, sought for the entozoon in the dog, and found it in great abundance. This dog belonged to himself, and had long been the subject of a "pustular affection" of the skin. Mr. Topping attributed the disease to the presence of the animalcules, an opinion which was, however, combated by Mr. Wilson.

Since 1843, the parasite has been very frequently found in the dog; and in 1849, M. Leblanc, "Medecin Veterinaire," Paris, described a disease of this animal, ending in marasmus, and destroying the dog in about two months, which he attributed chiefly to the existence of these creatures in immense numbers in the follicles of the skin.

In 1851, we also obtained a large number of these parasites from a dog affected with skin disease, which was accompanied by extensive desquamation of hair and cuticle, and a discharge of a dark colored unctuous fluid from the follicles. It was singular, however, that in this instance the dog showed little or no disposition to scratch himself, as is ordinarily the case in skin diseases.

Compared with the fully developed *Acarus Folliculorum* of man, the body of that of the dog is scarcely more than half as long. This shorter length, however, does not seem to be due to immaturity, for in all the specimens which we have examined, we have not met with a single deviation from this rule. With the exception of this diminished length of body, there is so close an identity in these acari, that a description of one applies equally to the other. According to Erasmus Wilson, the acarus of man varies in its entire length, from 1-64th to 1-135th of an inch, and in the length of its abdomen, from 1-88th to 1-227th, while in both extremes the width of the thorax is the same, viz., 1-555th of an inch.

"The animal is divisible into a head, thorax and abdomen, the whole of these parts being well and distinctly marked. The head represents in form a truncated cone, flattened from above downwards, and directed obliquely downwards from the anterior part of the trunk. It is composed of two large lateral organs, termed by Simon 'maxillary palpi,' and of an intermediate triangular organ." * * * * "The thorax, which is the broadest and thickest part of the animal, and somewhat tun-shaped, is flattened on its under surface. It is composed of four broad segments, which are free, and joined by a connecting membrane on the dorsum and sides of the creature, but are continuous inferiorly with the broad and strong *plastron*, which covers the whole inferior surface of the thorax. The segments are somewhat convex in their antero-posterior diameter, particularly at the upper part, so that the outline of the chest in this situation has the appear-

ance of being slightly fluted." * * * * "The segmented structure of the thorax permits of a certain degree of movement in this part of the creature. The *legs*, which are eight in number, are connected with the sides of the *plastron*, each segment of the thorax sustaining one pair of these organs. They are conical in figure, the base of the cone being broad, and its apex obtusely truncated, and furnished with three finger-like claws. Each leg is composed of three segments." * * * * "The legs are all the same size." * * * * "The *abdomen* is somewhat variable in point of length. It is flattened on its under surface, and convex above, and tapers gradually from its base to its extremity, where it terminates in a rounded point. It is composed of a series of extremely narrow annular segments, which overlap each other from before backwards." * * * * "The annulated structure of the abdomen, which is here described, permits it to move with considerable freedom, and to curve in any direction."

THE MANAGEMENT OF AGRICULTURAL FAIRS.

BY J. M. SMITH.

[From the Report of the Secretary of the Massachusetts Board of Agriculture.]

On the 20th of July, 1794, Washington, then President of the United States, addressed a letter to Sir John Sinclair, in which he says: "It will be some time, I fear, before an agricultural society, with congressional aid, will be established in this country."

Again, in his annual address, on the 7th of December, 1796, when he met for the last time the two houses of Congress, he said: "It will not be doubted, that in reference to individual or national welfare, agriculture is of primary importance."

Thus it is seen that he who is called the "father of his country" was strongly impressed with the importance of forming agricultural societies, and that they should be assisted by the general government, that they might be the means of diffusing information—of creating and encouraging a spirit of experiment and improvement.

Some few individuals, even before this date, had felt the necessity for some action that would lead to the development of the agricultural resources of the country, and as the result, the South Carolina Agricultural Society had been established in 1784.

The Philadelphia Society for the Improvement of Agriculture was formed the same year, followed by a similar association in New York, in 1791, which was incorporated in 1798.

The Massachusetts Society for Promoting Agriculture was incorporated in 1792, but owing to the fact that the mass of farmers were not prepared for any progressive effort, and were prejudiced against what might be called "book farming," they did not hold any public exhibition till 1816.

The first agricultural exhibition ever held in this country, was held in Georgetown, D. C., on the 10th of May, 1810. The society was organized in Georgetown, on the 28th of the November, 1809.

The first county exhibitions held in this country, are believed to have been those of the Berkshire County Agricultural Society, whose first "cattle show" consisted of the exhibition of three merino

sheep, by a private individual, under the great elm tree in Pittsfield, in the year 1810.

The Berkshire Society was incorporated in the winter of 1810-11. Although the first exhibition was held in Berkshire County, there had been agricultural societies formed previously. The Kennebec Agricultural Society was instituted at Augusta, Maine, which was then a part of Massachusetts, in 1800, and incorporated in 1801. An association was formed in Middlesex County in 1794, and incorporated in 1803.

From this era agricultural societies and fairs have multiplied throughout the United States. State agricultural societies have been formed in almost every State, and county societies in almost every county in the Union.

There have been several attempts to establish a National Agricultural Society. In 1840 several gentlemen, with Solon Robinson, Esq., at their head, organized the "United States Agricultural Society," but being somewhat disappointed in not securing the donation which was afterwards given to establish the Smithsonian Institution, they never held a meeting after its organization.

In 1852, a convention was held at the Smithsonian Institution, composed of one hundred and fifty-three delegates, representing the principal agricultural societies in twenty-three of the States and Territories. Annual exhibitions have been held in several of the States, and there is no doubt but that they have increased the efficiency of the State and local associations, and elevated the standard of excellence of agricultural systems and productions.

The interest of agriculture demands, and it is of so much importance, that it should receive, liberal governmental aid. Figures tell us that agriculture is the leading interest in the country; that forty-five per cent. of our population are engaged in agricultural pursuits,—more than one-half larger than those who are engaged in manufactures and the leading trades, more than four times larger than those engaged in merchandise, and nearly ten times larger than those in the professions.

And our government is doing many things for our whole country. There has never been a time when our National and State governments were doing so much for American farmers as at the present day. And although we cannot see what will be the ultimate effect of this aid upon our agriculture, still there can be no doubt that a glorious success is reserved for the future.

One of the objects our government has in view, is the elevation of the character of American farmers as tillers of the soil which they cultivate. The mind must be enlightened in the knowledge of science and arts, before we can proceed a step in any improvement. For this purpose the government has been expending sums of money in collecting reliable information, and in diffusing it among the working farmers of the land.

Statistics show that our soil does not produce from year to year one-half the amount of grass, hay and grain that it is capable of producing under scientific cultivation. And many of our farmers are opening their eyes to this important consideration, and are commencing different systems of agriculture, that they may, by judicious management, raise two tons of hay with less expense than they used to produce one ton. They find that there is an inexhaustible resource of fertility in the soil beneath, and in the air; and that in husbanding these resources, and by taking proper care of the elements of fertility, the soil may be made more productive.

Massachusetts, ever ready to lend her hand to assist in every laudable enterprise, has shown a disposition to encourage every branch of industry,—to open her purse for the literary and agricultural education of all her citizens. By her bounty to the county societies we are encouraged, and the cause of agriculture promoted. In 1838 the legislature of the Commonwealth passed an "An act to encourage the production of Wheat." At a later date, "An act to encourage the production of Silk." In 1852 the State Board of Agriculture was established, which now consists of the governor, lieutenant-governor, secretary of state and the president of the Massachusetts Agricultural College, who are members *ex-officiis*, and also one member chosen by each of the agricultural societies in the Commonwealth receiving State bounty, and three members who are appointed by the governor and council; in all thirty-three members besides their Secretary.

Our agricultural societies are doing much to elevate the system of agriculture. The annual gatherings of farmers, when their choicest animals are brought together for the inspection of brother farmers, tends to make the annual cattle show the most improving of any day of the year. Farmers learn by sight and comparison. Many a farmer, after attending one of these autumnal exhibitions, has been led to make new resolves, to turn over new leaves, to exert himself, that he may compete with his neighbors in rendering

the show more attractive, and thereby he himself is elevated ; he is induced to think and investigate, and instead of a mere machine he becomes a reasoning being, and capable of giving information to others.

How our agricultural fairs may be conducted so as to render them of the greatest practical benefit to those for whom they are instituted, is a subject which may well engross our attention. In this State there are twenty-five incorporated societies which hold annual fairs, and in each nearly the same routine is gone through with, differing, of course, as customs and habits in one section of the State may differ from those of another. The most of these societies are the owners of a tract of ground, which is enclosed by a high and tight board-fence. The exhibition is made of all kinds of farm-stock and of agricultural implements. A hall, set apart for the purpose, is filled with grains, seeds, vegetables, fruits, field products, mechanic and the fancy arts, both ornamental and useful, and every variety of manufacture, which is the product of home industry. It is customary, also, to invite some distinguished learned gentleman from abroad to give an address upon some agricultural subject.

Now this is all very well, and is the source of profit to a large class of the agricultural community. Farmers, as a class, do not have holidays enough ; do not spend time enough in relaxation, in going about from place to place endeavoring to acquaint themselves with what is transpiring around them ; in gaining new ideas and facts respecting their own occupation.

Professor Agassiz tells us that literary institutions should be continually endeavoring to raise their standard of education, and why should not this apply equally well to agricultural schools, societies and fairs ? What new plans shall we adopt,—what changes can be made,—what series of experiments can be instituted that facts may be ascertained, statements and theories proved to be either correct or false ?

In order to awaken a new interest, we need to make some changes in the programme for the fair days. It has been recommended, and it seems to be desirable, that stock which is brought for exhibition should remain on the ground during the whole time of the show. It is well known that there are objections to this course ; but if some way could be adopted by which it could be brought about, it would no doubt prove beneficial.

Every agricultural society should hold meetings for discussion in connection with its fairs. It is by the interchange of sentiments, the exchange of ideas, that we derive useful knowledge. Almost every farmer will have acquired some facts that will be new to others.

Some societies have offered premiums for reports made by committees, that these reports may appear in the society's published Transactions. This is very much to be commended, for every society should publish the report of their doings in a pamphlet form ; and it is to be hoped that this Board will recommend to the legislature to pass a law making it obligatory upon all societies to do this, and in case of non-compliance shall subject them to the forfeiture of their State bounty.

The secretaries of each society should be required to furnish a full printed report of their doings, in accordance with the law, as found in the General Statutes, chapter 66, section 5.

Our State gives the annual bounty for the promotion of agricultural improvements, and for our advancement in the knowledge and science of agriculture ; and how shall we become acquainted with whatever knowledge others have acquired, if we are not informed of it by the means of the press ?

Your Secretary collects, or would collect, from these printed reports all valuable matter to be placed in his Annual Report, which is published at the expense of the State and sent out to the world.

Some societies in our State have adopted the plan of giving the premium in its value in silver plate, which I think is worthy to be adopted by all our societies. However large or small these premiums may be, by this mode every family will have a memento, which, by its daily use, and by its having the name of the donor inscribed thereon, is a continual reminder of the giver, and the object of its existence.

In most cases when a small premium is awarded, the money received soon passes out of sight and of mind, with no permanent benefit to the recipient. Again, in many instances a premium is awarded to an individual who cares nothing for its value only as it tells that he received a high premium. And in such instances would not a diploma better accomplish the results desired ?

There is one point in the management of fairs that has not received the attention which its importance demands. Instead of the principal attention of those attending the fairs being given to that

portion of the show grounds devoted to stock, as cattle, sheep, &c., and to the exhibition of agricultural implements, there is a tendency to allow the exhibition of the horse, in what is called a "horse-trot," to absorb the whole interest, not only of the people, but of the managers and officers of the society. The practice of paying the largest premiums for purposes not calculated to promote their interest, has a tendency to prevent some good farmers from attending the fairs. The practice of giving the highest premium, not to the animal which is calculated to be of the greatest benefit to the farmer, but to those that are kept exclusively for show, will not promote their best interest.

But say the advocates of such performances, "something must be done to draw a crowd." Draw a crowd! Suppose a crowd was not drawn? If an enlightened people who are interested in the highest success of agricultural employment are not interested enough in the exhibition of the best of those animals which the county can furnish, which are not only useful but entirely essential to successful farming operations, to go and see them without being called together by some outside influences, let them stay away.

Is it not a serious question for the consideration of all officers of agricultural societies, whether they are justified in providing for, and promoting, all such performances? Whether they will be justified in spending not only money, but time, to so little public advantage. Mr. Sanford Howard, of the Michigan Agricultural College, in an address delivered by him a short time since, remarked upon the position the horse should take in our agricultural shows, as follows :

"Is any real improvement effected, or even contemplated by these premiums on trials of speed? It has already been remarked that premiums have been offered for the fastest trotting at short distance; only light weights are drawn; so that the contest is reduced to a mere test of speed, wholly irrespective of other properties.

"It follows, of course, that the winning horse is in many cases, not one of any value for any purposes of usefulness. That in some instances he will not bring so much in market as is awarded to him in premium.

"It is true this is not always the result of these trials. Horses that are valuable for something besides speed for short distances, with light weights, do sometimes win; but when they do, they

stand no higher in the scale of honor, than the scrub, that has done the same thing. And it must be evident that the offering of premiums for mere speed, if it has any influence at all, tends to the production of horses in which the more useful properties are found in an inferior degree.

"But perhaps it would be asked, would you shut out the horse from any participation in agricultural exhibitions? Certainly not! The horse is one of the most useful of our domestic animals, and his improvement should not be overlooked by agricultural societies.

* * * * *

"If it should be desired to test the rate of speed by time, the fairest way to do it would be to try each horse by himself in a most quiet way. Where horses are put upon the track in competition with each other, it is difficult, and in some cases impracticable, to settle the question of the rate of speed, of which they are relatively capable, on account of the excitement which affects them.

"The 'green horse' of the rural districts, unaccustomed to the strange sights and sounds of such an occasion, cannot act naturally, and stands no chance with the trained nag of perhaps much less power of speed.

"Most persons who have witnessed such contests, must have proof that the race is not always to the swift,—that the tricks of jockeys have more to do with the result than the speed of the animals. Often has the writer heard the remark, when thousands were watching the result, with breathless anxiety, 'That the drivers knew before starting which horse was to be the winning one.'"

Again, the editor of the "Canada Farmer," who attended the exhibition of the New England Agricultural Society, held at Concord, N. H., in 1865, remarks in his paper upon the corruption of agricultural fairs as follows:

"The display of horses is a fine one, and forms, perhaps, the leading feature of the exhibition. It is rather extraordinary that this should be so, just after a four years' war, which has been supposed to have drained the country of good horses.

"The arrangement and order of the show left nothing to be desired. Provisions were amply supplied at booths and tents on the grounds. No intoxicating drinks were permitted within the precincts, and not an instance of inebriety met our notice.

"We were surprised, however, to find that whirley-go-rounds, and side shows, of bears, snakes, war scenes, fat women and skeleton men, were admitted within the enclosure. Still greater was our astonishment to find that horse-racing formed a most prominent feature in the proceedings, as conducted by the agricultural society.

"There was a trot each day, and purses to the amount of \$1,000 were offered by the society out of its funds. The excuse for this is, that the people will not come out in sufficient numbers to pay expenses, unless racing is provided for."

The same editor says further: "Who would have thought this in sober New England, the land of steady habits. Without at all touching the morality of horse-racing, we cannot help thinking that it is wholly out of place at an agricultural exhibition, and if our New England friends are at all inquisitive as to how it 'strikes a stranger,' they are welcome to our unqualified condemnation of the thing. And we cannot help thinking that in various ways, the horse-racing must in a long run, operate unfavorably upon the interests of the agricultural society."

And, gentlemen, if this is the way that our agricultural fairs 'strike a stranger,' and a foreigner, I ask again, if it is not a serious question for the consideration of all the officers of our agricultural societies, whether they are justified in providing for, and promoting such performances.

And is it not about time when all societies who are receiving State patronage should be made to run without the aid of fat women, distorted men, gambling tables and horse-racing? When all gates are taken away, the exhibition made open to the competition of the whole State or county, and free to the whole world?

I ask if the time has not come when this step should be taken, as one of the means for the elevation of the standard and character of our agricultural societies? If our societies cannot be sustained without mixing up public demoralizers, in the shape of gambling establishments and shows of a low character, whereby the evil influence which it has upon a community, and especially upon the rising generation, is greater than the benefit derived, then let them go down.

Better by far would it be for our State to give each society twice the sum she now gives, than that debasing influences be resorted to to fill up treasuries; for no amount of prosperity can compensate for the loss of public morals.

Better by far would it be if the amount now given to the societies be given to one-half their number, and the other half suffered to die out, than that our young men be educated for horse-races, drunkards and gamblers !

But our State and county fairs may be made useful. They have contributed to the progress of agricultural improvement throughout the country. Thousands have visited them and have seen specimens of this progress. They have learned that their own animals, which they supposed could not be beaten in the whole world, are left quite in the shade by many which they find at the shows.

The improvements which have been made in everything connected with farming operations can be plainly seen in every agricultural community. A better character of farming is maintained—more thrift and profit. Buildings and fences are repaired, or new ones, built on improved plans, are put in their places ; hedges and fence corners are cleared up, and crops yield more per acre. Stock of all kinds is improved ; new and pure bloods are introduced ; emulation and enterprise are excited, and improvement takes place.

A great change has been made in agricultural implements within a few years. Manufacturers have made use of fairs to advertise their wares, by which means they have been brought under the immediate notice of the farmer, who has commented upon their excellences and imperfections, and improvements suggested, of which the maker has taken advantage. These are some of the benefits which have followed, as the result, either directly or indirectly, of agricultural fairs.

But a great burden of responsibility rests upon the officers and managers of these societies to make these fairs what they ought to be. The right men should be selected for office—men who have strong sympathy with the farming interests, and men who are willing to promote them by attention to the duties of their office.

It is no sinecure to manage the details of a fair ; and a man who loves honor, and does not love work, should never accept office in an agricultural society. The committees, especially, should be men acquainted with their respective duties. But a successful fair demands something more than a judicious selection of committees. They must attend to their duties.

But it is out of the power of any board of managers, to make a fair a success, without the coöperation of the people. There should

be a hearty, healthy interest in the mind of every farmer in the county, for the successful carrying out of everything which is for the interest of his county society.

Every farmer should take pride in it, and use it as an instrumentality made by him for his own benefit, and should go to its business meeting, with the full resolve to do all that in him lies for its prosperity; that it may be made a power to be felt throughout the county, in the improvement of husbandry, and a direct instrumentality to benefit each, by the influence which it exerts on all.



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